

Service Manual

LG-P350

Table Of Contents

1. INTRODUCTION.....	3	4.4 Checking GSM TX Module(GSM PAM + FEM) Block.....	78
1.1 Purpose	3	4.5 Checking WCDMA Block	81
1.2 Regulatory Information	3	4.6 Checking GSM Block.....	91
1.3 Abbreviations.....	5	4.7 GPS/WIFI/BT RF Component	99
2. PERFORMANCE.....	7	4.8 GPS/WIFI/BT SIGNAL PATH	101
2.1 Product Name.....	7	4.9 GPS/WIFI/BT Trouble shooting	103
2.2 Supporting Standard.....	7	4.10 Power ON Troubleshooting.....	109
2.3 Main Parts : GSM Solution.....	7	4.11 Charging Trouble shooting.....	113
2.4 HW Features	8	4.12 3M FF Camera trouble	117
2.5 SW Features	10	4.13 Audio Trouble.....	120
2.6 HW SPEC.	13	4.14 Main LCD trouble.....	132
3. TECHNICAL BRIEF	19	4.15 Motion Sensor on/off trouble.....	134
3.1 GENERAL DESCRIPTION	19	4.16 Compass Sensor on/off trouble.....	136
3.2 GSM MODE	21	4.17 Q coin Motor.....	138
3.3 UMTS MODE.....	23	5. DOWNLOAD	140
3.4 GPS RECEIVER.....	26	6. BLOCK DIAGRAM.....	153
3.5 LO GENERATION and DISTRIBUTION CIRCUIT.....	26	7. CIRCUIT DIAGRAM	158
3.6 OFF-CHIP RF COMPONENTS	27	8. BGA Pin Map	166
3.7 Digital Baseband(DBB/MSM7227).....	32	9. PCB LAYOUT.....	170
3.8 Hardware Architecture.....	33	10. CALIBRATION.....	172
3.9 Subsystem (MSM7227)	35	10.1 General Description.....	172
3.10 Power Block.....	38	10.2 Requirement.....	172
3.11 External memory interface.....	43	10.3 Setup for RF calibration.....	173
3.12 H/W Sub System.....	44	10.4 Tachyon Software Installation	173
3.13 Audio and sound	51	10.5 Tachyon Start.....	174
3.14 Display.....	57	10.6 Overview of RF Calibration	179
3.15 Vibrators (Q-Coin Motor)	59	11. STAND ALONE TEST	183
3.16 Compass Sensor.....	60	12. EXPLODED VIEW & REPLACEMENT PART LIST	190
3.17 Motion Sensor.....	62	12.1 EXPLODED VIEW.....	190
3.18 Main Features	63	12.2 Replacement Parts	191
3.19 Main component	64	12.3 Accessory	215
4. TROUBLE SHOOTING	71		
4.1 RF Component	71		
4.2 SIGNAL PATH	73		
4.3 Checking TCXO Block.....	76		

1. INTRODUCTION

1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

1.2 Regulatory Information

A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common carrier telecommunication service of facilities accessed through or connected to it. The manufacturer will not be responsible for any charges that result from such unauthorized use.

B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the phones or compatibility with the net work, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

D. Maintenance Limitations

Maintenance limitations on the phones must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

G. Interference and Attenuation

A phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

H. Electrostatic Sensitive Devices

ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the  sign.

Following information is ESD handling:

- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIO	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

1. INTRODUCTION

PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STMR	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

2. PERFORMANCE

2.1 Product Name

LG-P350 : WCDMA900/2100+EGSM/GSM850/DCS/PCS
(HSDPA 3.6Mbps GPRS Class 12 / EDGE Class 12)

2.2 Supporting Standard

Item	Feature	Comment
Supporting Standard	WCDMA(FDD1,8)/EGSM/GSM850/DCS1800/PCS1900 with seamless handover Phase 2+(include AMR) SIM Toolkit: Class 1, 2, 3, C-E	
Frequency Range	WCDMA(FDD1) TX : 1920 – 1980 MHz WCDMA(FDD1) RX : 2110 – 2170 MHz WCDMA(FDD8) TX : 880 – 915 MHz WCDMA(FDD8) RX : 915 – 960 MHz EGSM TX: 880 – 915 MHz EGSM RX: 925 – 960 MHz GSM850 TX: 824 – 849 MHz GSM850 RX: 869 – 894 MHz DCS1800 TX : 1710 – 1785 MHz DCS1800 RX: 1805 – 1880 MHz PCS1900 TX: 1850 – 1910 MHz PCS1900 RX: 1930 – 1990 MHz	
Application Standard	WAP 2.0	

2.3 Main Parts : GSM Solution

Item	Part Name	Comment
Digital Baseband	MSM7227 : Qualcomm	
Analog Baseband	PM7540 : Qualcomm	
RF Chip	RTR6285 : Qualcomm	

2.4 HW Features

Item		Feature	Comment
Form Factor		DOP type	
Battery	1) Capacity Standard : Li-Ion , 1280mAh		
	2) Packing Type : Soft Pack		
Size		Standard : 108 x 57.5 x 12.2mm	
Weight		108g	With Battery
Volume		TBD	
PCB		L1B1 type, 8 Layers , 0.8t	
Stand by time		2G Up to 580 hrs	@ Paging Period 9 (2G)
		3G Up to 510 hrs	@ DRX 8 (3G)
Charging time		3 hrs	@ Power Off / 1280mAh
Talk time		2G Up to 450mins	@ Power Level 10 (2G)
		3G Up to 420mins	@ Tx = 0dBm (3G)
RX sensitivity		WCDMA(FDD1) : -106.7 dBm WCDMA(FDD8) : -103.7 dBm EGSM : -105 dBm GSM850 : -105 dBm DCS 1800 : -105 dBm PCS 1900 : -105 dBm	
TX output power	WCDMA/ GSM/ GPRS	WCDMA : 24dBm/3.84MHz,+1/-3dBm EGSM : 33dBm GSM850 : 33 dBm DCS 1800 : 30 dBm PCS 1900 : 30 dBm	Class3(WCDMA) Class4 (EGSM) Class4 (GSM850) Class1 (PCS) Class1 (DCS)
	EDGE	GSM 900 : 27 dBm DCS 1800 : 26 dBm PCS 1900 : 26 dBm	E2 (GSM900) E2 (PCS) E2 (DCS)
GPRS compatibility		GPRS Class 12	
EDGE compatibility		EDGE Class 12	
SIM card type		Plug-In SIM 3V /1.8V	

2. PERFORMANCE

Display	Main LCD TFT Main LCD(2.8', 320 x 240)	
Built-in Camera	3M FF CMOS Camera	
Status Indicator	No	
Keypad	Function Key : 4 Side Key : 2	Function Key: Home, Back, Menu, Search Side Key : Volume up/down
ANT	Main : Internal Fixed Type	
System connector	5 Pin	
Ear Phone Jack	3.5Phi, 4 Pole, Stereo	
PC synchronization	Yes	
Memory	NAND Flash : 4Gbit SDRAM : 2Gbit	
Speech coding	FR, EFR, HR, AMR	
Data & Fax	Built in Data & Fax support	
Vibrator	Built in Vibrator	
Blue Tooth	V2.1+ EDR	
MIDI(for Buzzer Function)	SW Decoded 72Poly	
Music Player	MP3/ WMA/AAC/HE-AAC/EAAC+	
Video Player	MPEG4, H.263, H.264	
Camcorder	MPEG4, H.263, H.264	
Voice Recording	Yes	
Speaker Phone mode Support	Yes	
Travel Adapter	Yes	
CDROM	No	
Stereo Headset	Yes	
Data Cable	Yes	
T-Flash (External Memory)	Yes	

2.5 SW Features

Item	Feature	Comment
RSSI	0 ~ 4 Levels	
Battery Charging	0 ~ 6 Levels	
Key Volume	0 ~ 7 Level	
Audio Volume	1 ~ 15 Level	
Time / Date Display	Yes	
Multi-Language	Yes	English/French/German/Spanish/Italian/Danish/Dutch/Korean
Quick Access Mode	Dialing/ Contact / Menu / Message / Camera	
PC Sync	No	
Speed Dial	No	Voice mail center -> 1 key
Profile	Yes	not same with feature phone setting
CLIP / CLIR	Yes	
Phone Book	Name / Number / Email / Chat Id/ Website/Postal addresses/Organizations/Groups/ BirthdayNotes / Ringtone	There is no limitation on the number of items. It depends on available memory amount.
Last Dial Number	Yes	Last Dial Numbers, Last Received Numbers and Last Missed Numbers can store up to a total of 500.
Last Received Number	Yes	Last Dial Numbers, Last Received Numbers and Last Missed Numbers can store up to a total of 500.
Last Missed Number	Yes	Last Dial Numbers, Last Received Numbers and Last Missed Numbers can store up to a total of 500.
Search by Number / Name	Name	
Group	Yes	There is no limitation on the number of items. It depends on available memory amount.
Fixed Dial Number	Yes	

2. PERFORMANCE

Service Dial Number	No	
Own Number	Yes	Read only (add/edit/delete are not supported)
Voice Memo	Yes	
Call Reminder	No	
Network Selection	Automatic	
Mute	Yes	
Call Divert	Yes	
Call Barring	Yes	
Call Charge (AoC)	Yes	
Call Duration	Yes	
SMS (EMS)	There is no limitation on the number of items. It depends on available memory amount.	EMS does not support.
SMS Over GPRS	No	
EMS Melody / Picture	No	
Send / Receive / Save	No	
MMS MPEG4 Send / Receive / Save	Yes	
Long Message	MAX 459 characters	SMS 3pages
Cell Broadcast	Yes	
Download	Over the Web	
Game	Yes	
Calendar	Yes	
Memo	Yes	There is no limitation on the number of items. It depends on available memory amount.
World Clock	No	
Unit Convert	No	
Stop Watch	No	
Wall Paper	Yes	

2. PERFORMANCE

WAP Browser	No	Support only web browser based on webkit. WAP stack and wml are not supported.
Download Melody / Wallpaper	Yes	Over web browser
SIM Lock	Yes	Operator Dependent
SIM Toolkit	Class 1, 2, 3, C	
MMS	Yes	Google MMS Client
EONS	Yes	
CPHS	Yes	V4.2
ENS	No	
Camera	Yes	3M FF / Digital Zoom : x4
JAVA	Yes	CLDC V1.1 / MIDP V2.1 Download Over Web
Voice Dial	No	
IrDa	No	
Bluetooth	Yes	Ver. 2.1+EDR (HSP,HFP,A2DP,AVRCP)
FM radio	Yes	
GPRS	Yes	Class 12
EDGE	Yes	Class 12
Hold / Retrieve	Yes	
Conference Call	Yes	Max. 6
DTMF	Yes	
Memo pad	No	
TTY	No	
AMR	Yes	
SyncML	Yes	
IM	Yes	
Email	Yes	

2.6 HW SPEC.

1) GSM transceiver specification

Item	Specification
Phase Error	Rms : 5° Peak : 20°
Frequency Error	GSM : 0.1 ppm DCS/PCS : 0.1 ppm
EMC(Radiated Spurious Emission Disturbance)	GSM/DCS : < -28dBm
Transmitter Output power and Burst Timing	GSM : 5dBm – 33dBm ± 3dB DCS/PCS : 0dBm – 30dBm ± 3dB
Burst Timing	<3.69us
Spectrum due to modulation out to less than 1800kHz offset	200kHz : -36dBm 600kHz : -51dBm/-56dBm
Spectrum due to modulation out to larger than 1800kHz offset to the edge of the transmit band	GSM : 1800-3000kHz : < -63dBc(-46dBm) 3000kHz-6000kHz : < -65dBc(-46dBm) 6000kHz < : < -71dBc(-46dBm) DCS : 1800-3000kHz : < -65dBc(-51dBm) 6000kHz < : < -73dBc(-51dBm)
Spectrum due to switching transient	400kHz : -19dBm/-22dBm(5/0), -23dBm 600kHz : -21dBm/-24dBm(5/0), -26dBm
Reference Sensitivity – TCH/FS	Class II(RBER) : -105dBm(2.439%)
Usable receiver input level range	0.012(-15 - -40dBm)
Intermodulation rejection – Speech channels	± 800kHz, ± 1600kHz : -98dBm/-96dBm (2.439%)
AM Suppression – GSM : -31dBm - DCS : -29dBm	-98dBm/-96dBm (2.439%)
Timing Advance	± 0.5T

2) WCDMA transmitter specification

Item	Specification
Transmit Frequency	Band1 : 1920 MHz ~ 1980 MHz Band8 : 880MHz ~ 915MHz
Maximum Output Power	+24 dBm / 3.84 MHz, +1 / -3 dB
Frequency Error	within ± 0.1 PPM
Open Loop Power Control	Normal Conditions : within ± 9 dB, Extreme Conditions : within ± 12 dB
Minimum Transmit Power	< -50 dBm / 3.84 MHz
Occupied Bandwidth	< 5 MHz at 3.84 Mcps (99% of power)
Adjacent Channel Leakage Power Ratio (ACLR)	> 33 dB @ ± 5 MHz, > 43 dB @ ± 10 MHz
Spurious Emissions $ f-f_c > 12.5$ MHz	< -36 dBm / 1 kHz RW @ $9 \text{ kHz} \leq f < 150 \text{ kHz}$ < -36 dBm / 10 kHz RW @ $150 \text{ kHz} \leq f < 30 \text{ MHz}$ < -36 dBm / 100 kHz RW @ $30 \text{ MHz} \leq f < 1 \text{ GHz}$ < -30 dBm / 1 MHz RW @ $1 \text{ GHz} \leq f < 12.75 \text{ GHz}$ < -60 dBm / 3.84 MHz RW @ $869 \text{ MHz} \leq f \leq 894 \text{ MHz}$ < -60 dBm / 3.84 MHz RW @ $1930 \text{ MHz} \leq f \leq 1900 \text{ MHz}$ < -60 dBm / 3.84 MHz RW @ $2110 \text{ MHz} \leq f \leq 2155 \text{ MHz}$ < -67 dBm / 100 kHz RW @ $925 \text{ MHz} \leq f \leq 935 \text{ MHz}$ < -79 dBm / 100 kHz RW @ $935 \text{ MHz} < f \leq 960 \text{ GHz}$ < -71 dBm / 100 kHz RW @ $1805 \text{ MHz} \leq f \leq 1880 \text{ MHz}$ < -41 dBm / 300 kHz RW @ $1884.5 \text{ MHz} < f < 1919.6 \text{ MHz}$
Transmit Intermodulation	< -31 dBc @ 5 MHz & < -41 dBc @ 10 MHz when Interference CW Signal Level = -40 dBc
Error Vector Magnitude	< 17.5 %, when Pout \geq -20 dBm
Peak Code Domain Error	< -15 dB at Pout \geq -20 dBm

3) WCDMA receiver specification

Item	Specification
Receive Frequency	Band1 : 2110 ~ 2170 MHz Band8 : 925 ~ 960 MHz
Reference Sensitivity Level	Band1 : BER < 0.001 when Îor = -106.7 dBm / 3.84 MHz Band8 : BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz
Maximum Input Level	BER < 0.001 when Îor = -25 dBm / 3.84 MHz
Adjacent Channel Selectivity (ACS)	ACS > 33 dB where BER < 0.001 when Îor = -92.7 dBm / 3.84 MHz & loac = -52 dBm / 3.84 MHz @ ±5 MHz
Blocking Characteristic	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & lblocking = -56 dBm / 3.84 MHz @ Fuw(offset) = ±10 MHz or lblocking = -44 dBm / 3.84 MHz @ Fuw(offset) = ±15 MHz
Spurious Response	BER < 0.001 when Îor = -103.7 dBm / 3.84 MHz & lblocking = -44 dBm
Intermodulation	BER < 0.001 when Îor= -103.7 dBm / 3.84 MHz & louw1 = -46 dBm @ Fuw1(offset) = ±10 MHz & louw2 = -46 dBm / 3.84 MHz @ Fuw2(offset) = ±20 MHz
Spurious Emissions	< -57 dBm / 100 kHz BW @ 9 kHz ≤ f < 1 GHz < -47 dBm / 1 MHz BW @ 1 GHz ≤ f ≤ 12.75 GHz
Inner Loop Power Control In Uplink	Adjust output(TPC command)
	cmd 1dB 2dB 3dB
	+1 +0.5/1.5 +1/3 +1.5/4
	0 -0.5/+0.5 -0.5/+0.5 -0.5/+0.5
	-1 -0.5/-1.5 -1/-3 -1.5/-4
	group(10equal command group)
	+1 +8/+12 +16/+24

4) HSDPA transmitter specification

Item	Specification				
Transmit Frequency	Band1 : 1920 MHz ~ 1980 MHz Band8 : 880MHz ~ 915 MHz				
Maximum Output Power	Sub-Test 1=1/15, 2=12/15 21~25dBm / 3.84 MHz 3=13/15 4=15/8 20~25dBm / 3.84 MHz 5=15/7 6=15/0 19~25dBm / 3.84 MHz				
HS-DPCCH	Sub-test in table C.10.1.4	Power step	Power step slot boundary	Power step size, P [dB]	Transmitter power step tolerance [dB]
	5	1	Start of Ack/Nack	6	+/- 2.3
		2	Start of CQI	1	+/- 0.6
		3	Middle of CQI	0	+/- 0.6
		4	End of CQI	5	+/- 2.3
Spectrum Emission Mask	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0				
	Frequency offset from carrier Δf		Minimum requirement		Measurement Bandwidth
	2.5 ~ 3.5 MHz		$-35-15\times(\Delta f-2.5)\text{dBc}$		30 kHz
	3.5 ~ 7.5 MHz		$-35-1\times(\Delta f-3.5)\text{dBc}$		1 MHz
	7.5 ~ 8.5 MHz		$-35-10\times(\Delta f-7.5)\text{dBc}$		1 MHz
	8.5 ~ 12.5 MHz		-49dBc		1 MHz
Adjacent Channel Leakage Power Ratio (ACLR)	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0 > 33 dB @ ± 5 MHz > 43 dB @ ± 10 MHz				
Error Vector Magnitude	< 17.5 %, when Pout \geq -20 dBm				

5) HSDPA receiver specification

Item	Specification
Receive Frequency	Band1 : 2110 ~ 2170 MHz Band8 : 925 ~ 960 MHz
Maximum Input Level (BLER or R), 16QAM Only	Sub-Test : 1=1/15, 2=12/15, 3=13/15, 4=15/8, 5=15/7, 6=15/0 BLER < 10% or R ≥ 700kbps

6) WLAN 802.11b transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -30 @ $f_c - 22\text{MHz} < f < f_c - 11\text{MHz}$ and $f_c + 11\text{MHz} < f < f_c + 22\text{MHz}$ ≤ -50 @ $f < f_c - 22\text{MHz}$ and $f > f_c + 22\text{MHz}$
Power ramp on/off time	≤ 2us
Carrier Suppression	≤ -15dB
Modulation Accuracy (Peak EVM)	≤ 35%
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	≤ -76dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Max input Sensitivity	≥ -10dBm(1Mbps,2Mbps,5.5Mbps,11Mbps) @ FER ≤ 8%
Rx Adjacent Channel Rejection	≥ 35dB @FER ≤ 8%, interference input signal -70dBm@ $f_c \pm 25\text{MHz}$ (11Mbps)

7) WLAN 802.11g transceiver specification

Item	Specification
Transmit Frequency	2400 MHz ~ 2483.5 MHz (CH1~CH13)
Tx Power Level	≤ 20dBm under (Europe), ≤ 30dBm under (USA)
Frequency Tolerance	within ±25 PPM
Chip clock Frequency Tolerance	within ±25 PPM
Spectrum Mask	≤ -20 @ ±11MHz offset (9Mhz ~ 11MHz) ≤ -28 @ ±20MHz offset (11MHz ~ 20Mhz) ≤ -40 @ ±30MHz offset (20MHz ~ 30Mhz)
Transmitter constellation error (rms EVM)	≤ -5dB
Spurious Emissions	< -36 dBm @ 30MHz ~ 1GHz < -30 dBm above @ 1GHz ~ 12.75GHz < -47 dBm @ 1.8GHz ~ 1.9GHz < -47 dBm @ 5.15GHz ~ 5.3GHz
Rx Min input Sensitivity	PER ≤ 10% -82dBm@6Mbps, -81dBm@9Mbps, -79dBm@12Mbps -77dBm@18Mbps, -74dBm@24Mbps, -70dBm@36Mbps -66dBm@48Mbps, -65dBm@54Mbps
Rx Max input Sensitivity	≥ -20dBm(6,9,12,18,24,36,48,54Mbps) @ PER ≤ 10%
Rx Adjacent Channel Rejection	PER ≤ 10%, ACR ≥ 16dB@6Mbps, ACR ≥ 15dB@9Mbps, ACR ≥ 13dB@12Mbps, ACR ≥ 11dB@18Mbps, ACR ≥ 8dB@24Mbps, ACR ≥ 4dB@36Mbps ACR ≥ 0dB@48Mbps, ACR ≥ -1dB@54Mbps ※ ACR shall be measured by setting the desired signal's strength 3 dB above the rate-dependent sensitivity specified in min input sensitivity

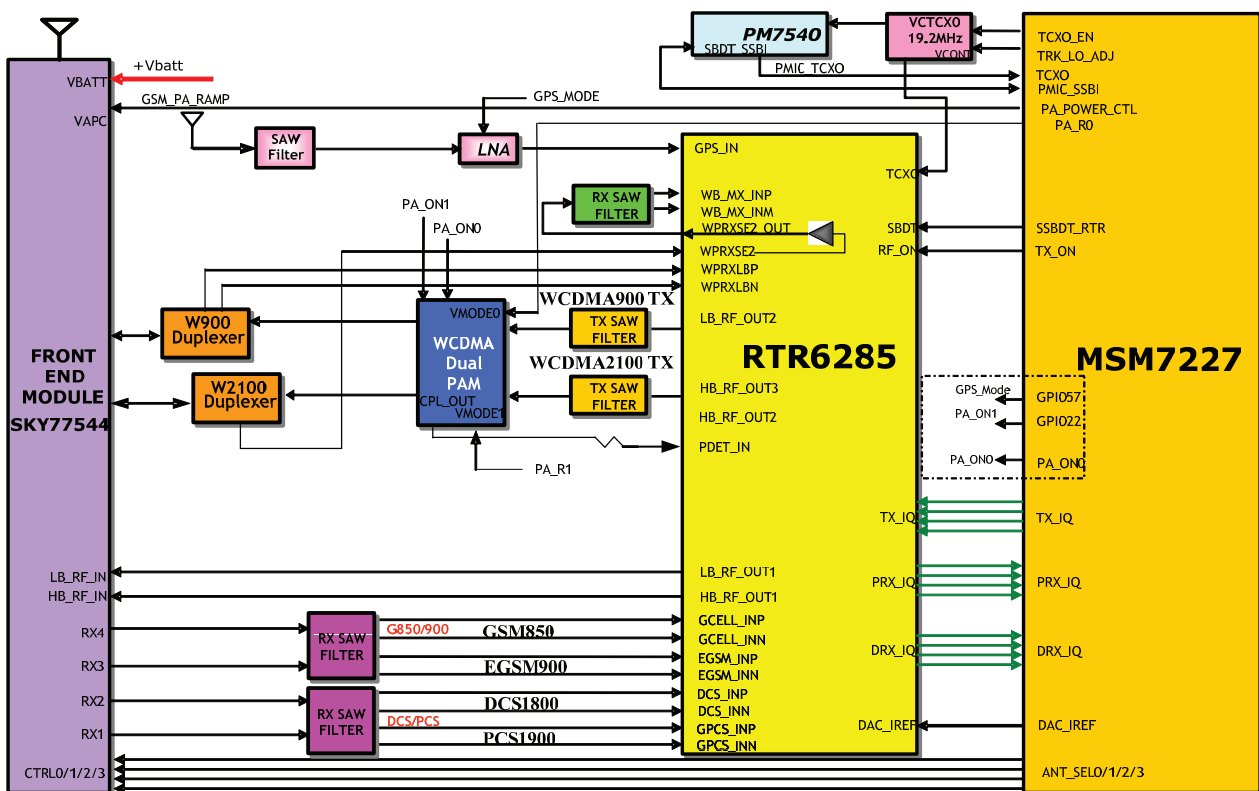
8) GPS receiver specification

Item	Specification
Receive Frequency	1574.42 MHz ~ 1576.42 MHz
Minimum Sensitivity	1 satellite ≥ -142dBm, 7 satellites ≥ -147dBm at coarse time aiding

3. TECHNICAL BRIEF

3.1 GENERAL DESCRIPTION

The LG-P350 supports UMTS-900, UMTS-2100, GSM-850, GSM-850, GSM-900, GSM-1800, and GSM-1900 based GSM/GPRS/EDGE/UMTS. All receivers and the UMTS transmitter use the radioOne1Zero-IF architecture to eliminate intermediate frequencies, directly converting signals between RF and baseband. The quad-band GSM transmitters use a baseband-to-IF upconversion followed by an offset phase-locked loop that translates the GMSK-modulated or 8-PSK-modulated signal to RF.



[Figure 1-1] Block diagram of RF part

A generic, high-level functional block diagram of LG-P350 is shown in Figure 1-1. One antenna collects base station forward link signals and radiates handset reverse link signals. The antenna connects with receive and transmit paths through a ASM(Antenna-Switch-Module).

The UMTS receive paths each include an LNA, an RF band-pass filter, and a downconverter that translate the signal directly from RF-to-baseband using radioOne ZIF techniques. The RFIC's Rx analog baseband outputs, for the receive chains, connect to the MSM IC. The UMTS and GSM Rx baseband outputs share the same inputs to the MSM IC.

For the transmit chains, the RTR6285 IC directly translates the Tx baseband signals (from the MSM device) to an RF signal using an internal LO generated by integrated onchip PLL and VCO. The RTR6285 IC outputs deliver fairly high-level RF signals that are first filtered by Tx SAWs and then amplified by their respective UMTS PAs. In the GSM receive path, the received RF signals are applied through their band-pass filters and down-converted directly to baseband in the RTR6285 transceiver IC. These baseband outputs are shared with the UMTS receiver and routed to the MSM IC for further signal processing.

The GSM/EDGE transmit path employs one stage of up-conversion and, in order to improve efficiency, is divided into phase and amplitude components to produce an open-loop Polar topology:

1. The on-chip quadrature up-converter translates the GMSK-modulated signal or 8-PSK modulated signal, to a constant envelope phase signal at RF;
2. The amplitude-modulated (AM) component is applied to the ramping control pin of Polar power amplifier from a DAC within the MSM. LG-P350 power supply voltages are managed and regulated by the PM7540 Power Management IC. This versatile device integrates all wireless handset power management, general housekeeping, and user interface support functions into a single mixed signal IC.

It monitors and controls the external power source and coordinates battery recharging while maintaining the handset supply voltages using low dropout, programmable regulators.

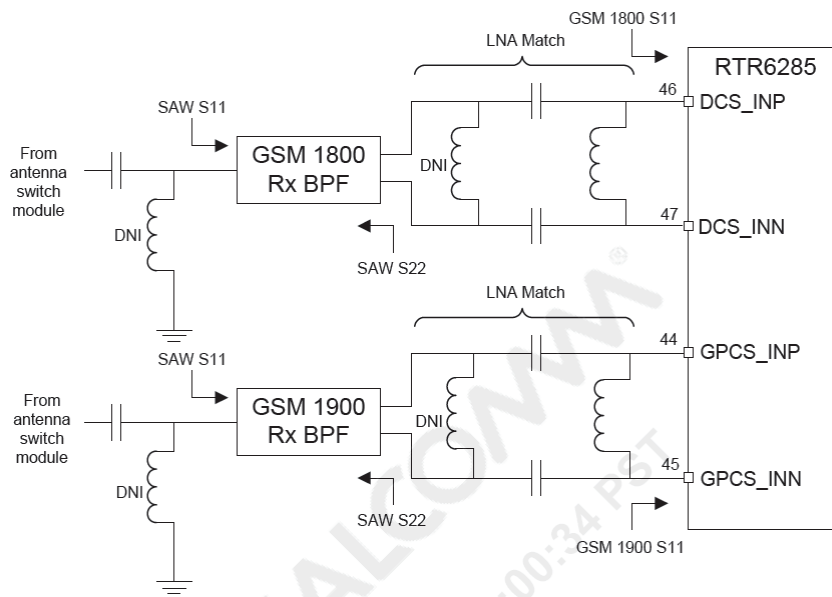
The device's general housekeeping functions include an ADC and analog multiplexer circuit for monitoring on-chip voltage sources, charging status, and current flow, as well as user-defined off-chip variables such as temperature, RF output power, and battery ID.

Various oscillator, clock, and counter circuits support IC and higher-level handset functions. Key parameters such as under-voltage lockout and crystal oscillator signal presence are monitored to protect against detrimental conditions.

3.2 GSM MODE

3.2.1 GSM RECEIVER

The GSM-850, GSM-900, GSM-1800, and GSM-1900 receiver inputs of RTR6285 are connected directly to the transceiver front-end Module. GSM-850, GSM-900, GSM-1800, and GSM-1900 receiver inputs use differential configurations to improve common-mode rejection and second-order non-linearity performance. For example Figure 1-2 shows receiver input topologies for DCS and PCS (GSM-850/900 have the same receiver input topologies). The balance between the complementary signals is critical and must be maintained from the RF filter outputs all the way into the IC pins.



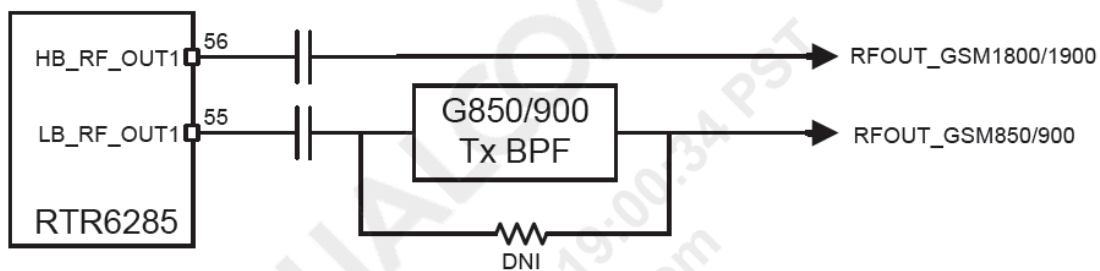
[Figure 1-2] DCS and PCS Receiver Inputs Topologies

Since GSM-850, GSM-900, GSM-1800, and GSM-1900 signals are time-division duplex (the handset can only receive or transmit at one time), switches are used to separate Rx and Tx signals in place of frequency duplexers – this is accomplished in the switch module. The GSM-850, GSM-900, GSM-1800, and GSM-1900 receive signals are routed to the RTR6285 through band selection filters and matching networks that transform single-ended 50-Ω sources to differential impedances optimized for gain and noise figure. The RTR input uses a differential configuration to improve second-order intermodulation and common mode rejection performance. The RTR6285 input stages include MSM-controlled gain adjustments that maximize receiver dynamic range.

The amplifier outputs drive the RF ports of the quadrature RF-to-baseband downconverters. The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) having passband and stopband characteristics suitable for GMSK or 8-PSK processing. These filter circuits include DC offset corrections. The filter outputs are buffered and passed on to the MSM7227 IC for further processing as shown in Figure 1-2.

3.2.2 GSM TRANSMITTER

The RTR6285 transmitter outputs(HB_RF_OUT1 and LB_RF_OUT1) include on-chip output matching inductors. 50ohm output impedance is achieved by adding a series capacitor at the output pins. The capacitor value may be optimized for specific applications and PCB characteristics based on pass-band symmetry about the band center frequency as shown in Figure 1-3.



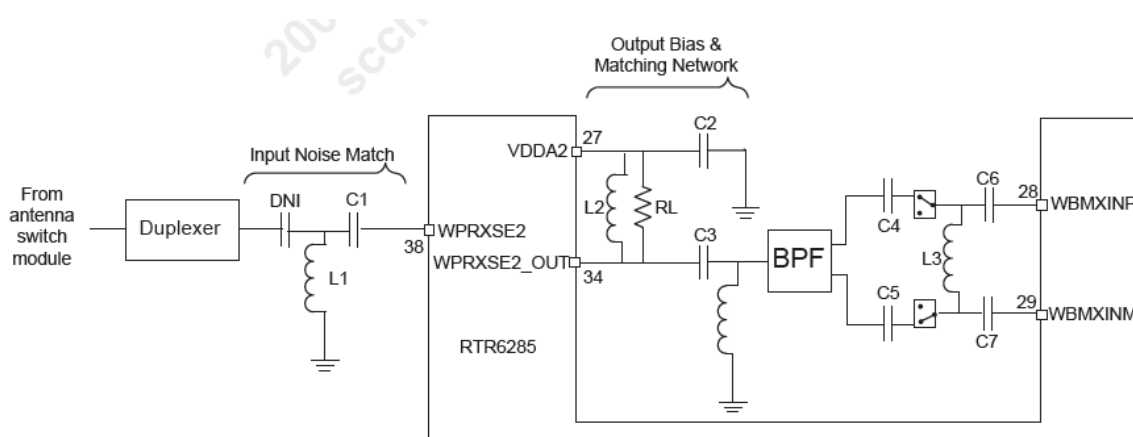
[Figure 1-3] GSM Transmitter Outputs Topologies

The RTR6285 IC is able to support GSM 850/900 and GSM 1800/1900 mode transmitting. This design guideline shows a tri-band GSM application. Both high-band and low band outputs are followed by resistive pads to ensure that the load presented to the outputs remains close to 50ohm.

3.3 UMTS MODE

3.3.1 UMTS RECEIVER

The UMTS duplexer receiver output is routed to LNA circuits within the RTR6285 device as shown in Figure 1-4. The UMTS Rx input is provided with an on-chip LNA that amplifies the signal before a second stage filter that provides differential downconverter as shown in Figure 1-5. This second stage input is configured differentially to optimize secondorder intermodulation and common mode rejection performance. The gain of the UMTS frontend amplifier and the UMTS second stage differential amplifier are adjustable, under MSM control, to extend the dynamic range of the receivers. The second stage UMTS Rx amplifiers drive the RF ports of the quadrature RF-to-baseband downconverters. The downconverted UMTS Rx baseband outputs are routed to lowpass filters having passband and stopband characteristics suitable for UMTS Rx processing. These filter circuits allow DC offset corrections, and their differential outputs are buffered to interface shared with GSM Rx to the MSM IC. The UMTS baseband outputs are turned off when the RTR6285 is downconverting GSM signals and on when the UMTS is operating.



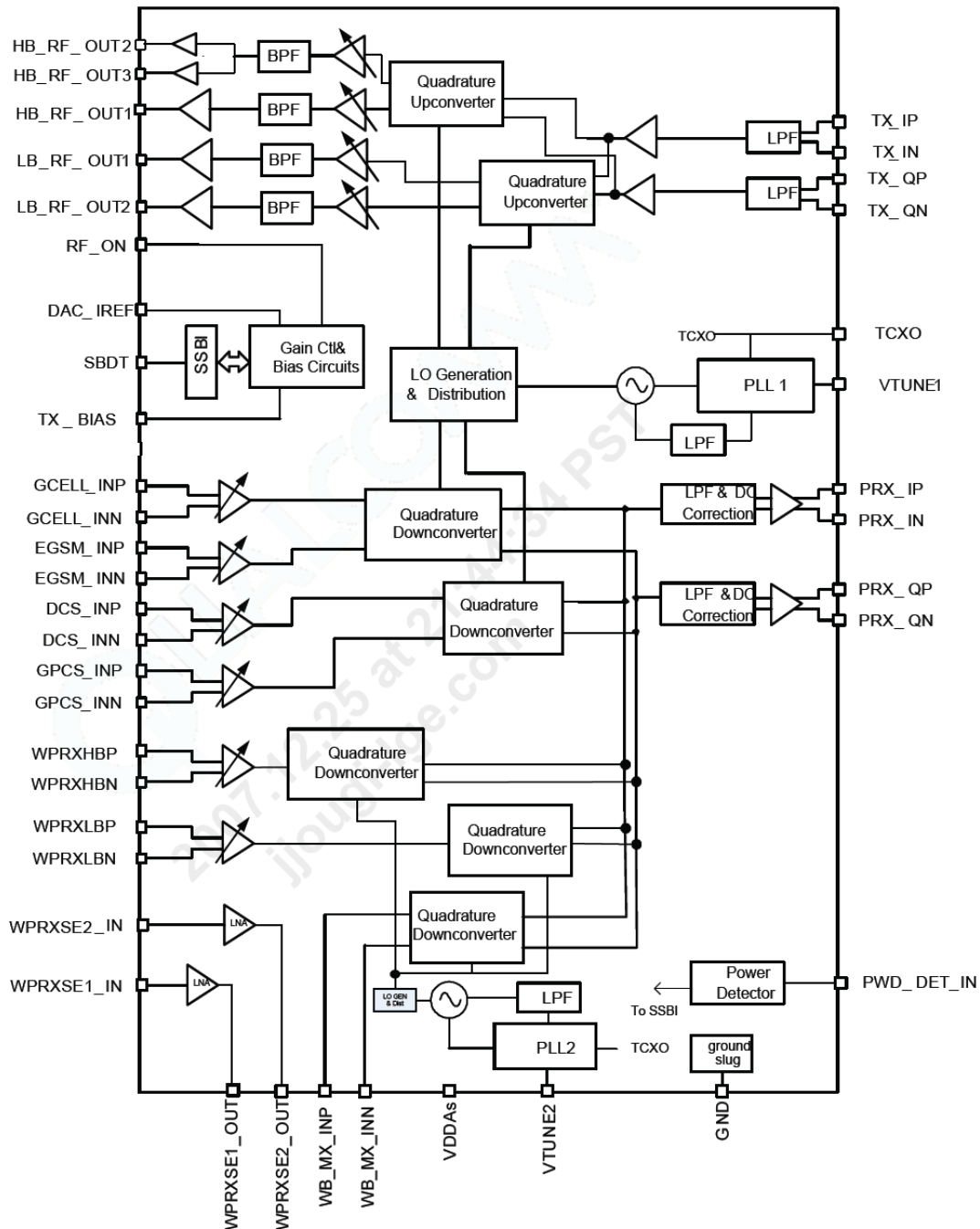
[Figure 1-4] UMTS Receiver Inputs Topologies

3.3.2 UMTS TRANSMITTER

The UMTS Tx path begins with differential baseband signals (I and Q) from the MSM device. These analog input signals are amplified, filtered, and applied to the quadrature up-converter mixers. The up-converter output is amplified by multiple variable gain stages that provide transmit AGC control. The AGC output is filtered and applied to the driver amplifier; this output stage includes an integrated matching inductor that simplifies the external matching network to a single series capacitor to achieve the desired 50-Ω interface.

The RTR6285 UMTS output is routed to its power amplifier through a bandpass filter, and delivers fairly high-level signals that are filtered and applied to the PA. Transmit power is delivered from the duplexer to the antenna through the switch module. The transceiver LO synthesizer is contained within the RTR6285 IC with the exception of the off-chip loop filter components and the VC-TCXO. This provides a simplified design for multimode applications. The PLL circuits include a reference divider, phase detector, charge pump, feedback divider, and digital logic generator.

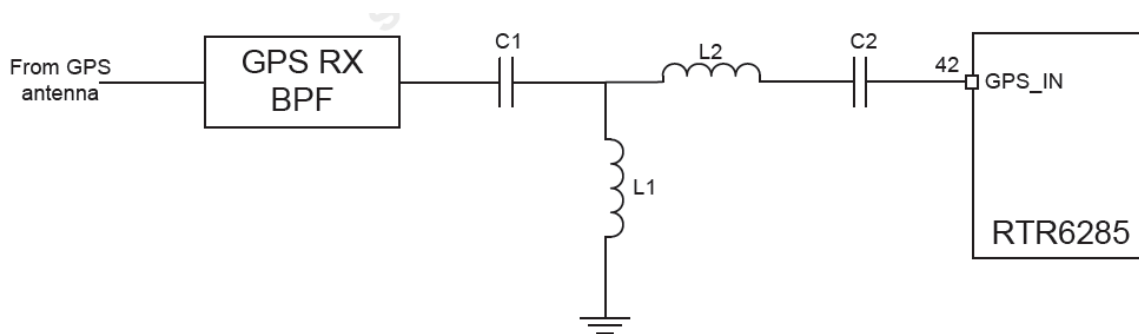
UMTS Tx. Using only PLL1, the LO generation and distribution circuits create the necessary LO signals for nine different frequency converters. The UMTS transmitter also employs the ZIF architecture to translate the signal directly from baseband to RF. This requires FLO to equal FRF, and the RTR6285 IC design achieves this without allowing FVCO to equal FRF. The RTR6285 IC is able to support UMTS 2100/1900/1800/1700 and 850 mode transmitting. This design guideline shows only UMTS 2100 applications.



[Figure 1-5] RTR6285 IC Functional Block Diagram

3.4 GPS RECEIVER

The GPS receiver input employs a single-ended connection realized by this pin. The GPS input is routed from the GPS antenna switch, through a band pass filter and then an impedance transformer circuit that optimally matches the impedance looking into the GPS LNA. The impedance transformer circuit topology is shown in Figure 1-6.



[Figure 1.6] GPS Input Network Topology

3.5 LO GENERATION and DISTRIBUTION CIRCUIT

The integrated LO generation and distribution circuits are driven by internal VCOs to support various modes to yield highly flexible quadrature LO outputs that drive all GSM/EDGE, UMTS band and GPS up-converters and down-converters; with the help of these LO generation and distribution circuits, true zero-IF architecture is employed in all GSM and UMTS band receivers and transmitters to translate the signal directly from RF-to-baseband and from baseband-to-RF. Two fully functional fraction-N synthesizers, including VCOs and loop filters, are integrated within the RTR6285 IC. In addition, the RTR6285 has a third synthesizer used for GPS operation. The first synthesizer (PLL1) in the RTR6285 creates the transceiver Los that support the UMTS transmitter, and all four GSM band receivers and transmitters including: GSM850, GSM900, GSM1800, and GSM1900. The second synthesizer (PLL2) in the RTR6285 IC provides the LO for the UMTS primary receiver. For the RTR6285 IC only, the second synthesizer also provides the LO for the secondary UMTS receiver. The third synthesizer (PLL3), only in the RTR6285 IC, provides the LO for the GPS receiver. An external TCXO input signal is required to provide the synthesizer frequency reference to which the PLL is phase and frequency locked. The RTR6285 ICs integrate most of the PLL loop filter components on-chip except for three off-chip loop filter-series capacitors, which significantly reduces off-chip component requirement. With the integrated fractional-N PLL synthesizers, the RTR6285 ICs have the advantage of more flexible loop bandwidth control, fast lock time, and low-integrated phase error.

3.6 OFF-CHIP RF COMPONENTS

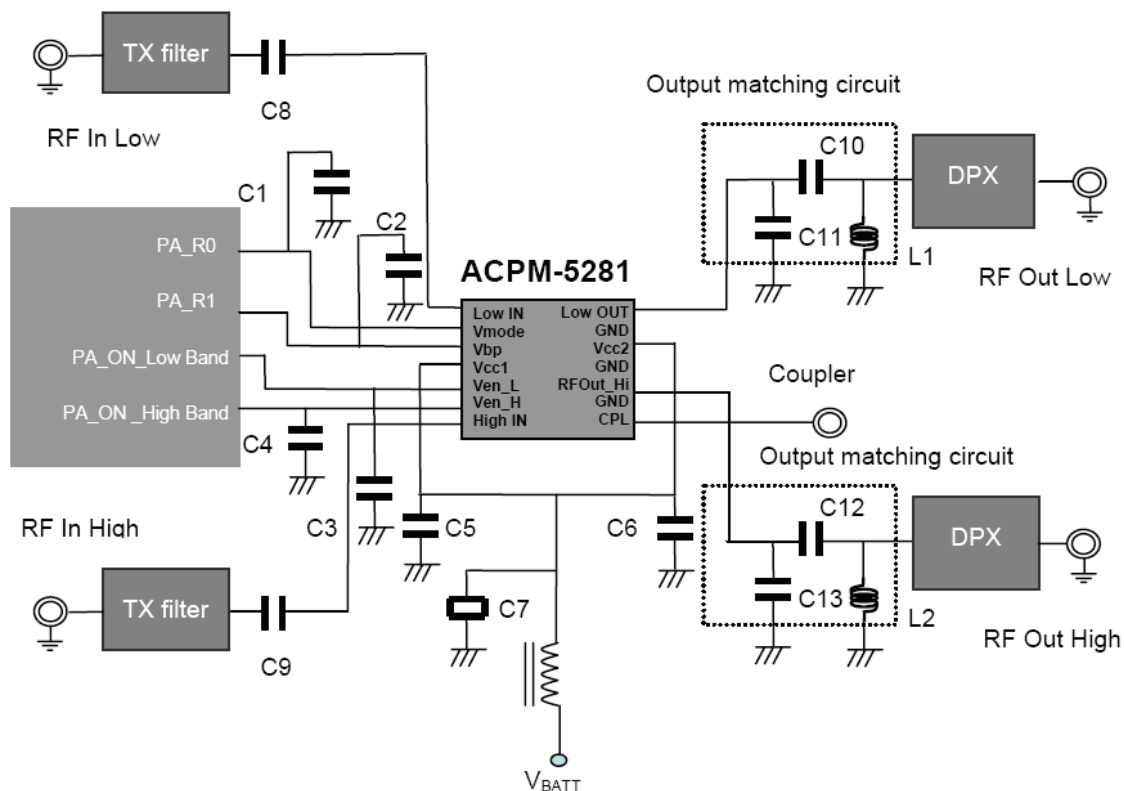
3.6.2. UMTS PAM (U1002, ACPM-5281)

The ACPM-5281 is a dual-band PAM (Power Amplifier Module) designed for UMTS Band1 and Band8. The ACPM-5281 meets stringent UMTS linearity requirements. The 4mmx5mm form factor 14-pin surface mount package is self contained, incorporating 50ohm input and output matching networks.

The ACPM-5281 features 5th generation of CoolPAM circuit technology which supports 3 modes – bypass, mid and high power modes. The CoolPAM is stage bypass technology which enables power amplifier to lower power consumption. Active bypass feature is added to 5th generation to enhance power added efficiency at low output range and this technology extends talk time of mobiles more by further saving power amplifier's current consumption.

The power amplifier is manufactured on an advanced InGaP HBT (hetero-junction Bipolar Transistor) MMIC (microwave monolithic integrated circuit) technology offering state-of-the-art reliability, temperature stability and ruggedness.

The Module is housed in a cost effective, small and thin 4x5mm package.



ACPM-5281 (W2100,W900)

3.6.2 19.2MHz VCTCXO (X300, DSA321SCL-19.2M)


The Voltage Controlled Temperature Compensated Crystal Oscillator (VCTCXO) provides the reference frequency for all RFIC synthesizers as well as clock generation functions within the MSM6285 IC. The oscillator frequency is controlled by the MSM6285 ICs.

TRK_LO_ADJ pulse density modulated signal in the same manner as the transmit gain control TX_AGC_ADJ. A two-pole RC lowpass filter is recommended on this control line.

The PM7540 IC controls the handset power-up sequence, including a special VCTCXO warm-up interval before other circuits are turned on. This warm-up interval (as well as other TCXO controller functions) is enabled by the MSM TCXO_EN line. The PM7540 IC VREG_TCXO regulated output voltage is used to power the VCTCXO and is enabled before most other regulated outputs. Any GSM mode power control circuits within the MSM7227 IC require a reference voltage for proper operation and sufficient accuracy. Connecting the PM7540 IC REF_OUT directly to the MSM7227 IC GSM_PA_PWR_CTL_REF provides this reference. This sensitive analog signal needs a 0.1 μ F low frequency filter near to MSM side, and isolate from digital logic and clock traces with ground on both sides, plus ground above and below if routed on internal layers.

7. Electrical Characteristics

($T_A = -30 \sim +85^\circ\text{C}$, $L_{\text{OAD_R/C}} = 5\text{k}\Omega/40\text{pF}$, $V_{\text{CC}} = +2.8\text{V}$, $V_{\text{CONT}} = +1.4\text{V}$, unless otherwise noted)

	Item	Conditions	Limits			unit	Notes
			min.	typ.	max.		
1	Current Consumption		-	-	1.8	mA	
2	Output Level		0.8	-	-	V _{P-P}	1
3	Symmetry	GND level (DC cut)	40/60	-	60/40	%	
4	Harmonics		-	-	-5	dBc	
5	Frequency Stability						
	1.Tolerance	After 2 times reflow	-	-	± 1.5	ppm	2,3
	2.vs Temperature	$T_A = -30 \sim +85^\circ\text{C}$ Ref. to Frequency ($T_A = +25^\circ\text{C}$)	-	-	± 2.0	ppm	
	3.Frequency Stability Slope	$T_A = -10 \sim +60^\circ\text{C}$ $T_A = -30 \sim -10^\circ\text{C}$ $T_A = +60 \sim +85^\circ\text{C}$	-	-	± 0.15	ppm/ $^\circ\text{C}$	
	4.vs Supply Voltage	$V_{\text{CC}} = +2.8\text{V} \pm 5\%$	-	-	± 0.2	ppm	
	5.vs Load Variation	$L_{\text{OAD_R/C}} = (5\text{k}\Omega/40\text{pF}) \pm 10\%$	-	-	± 0.2	ppm	
	6.vs Aging	$T_A = \text{Room ambient}$	-	-	± 0.7	ppm/year	
6	Start Up	@90% of final V_{OUT} level	-	-	2.0	ms	
		Within $\pm 0.5\text{ppm}$ of final frequency	-	-	3.0	ms	
7	Frequency Control						
	1.Control Range	$V_{\text{CONT}} = +1.4 \pm 1.0\text{V}$ (Ref. +1.4V)	± 7.8	± 9.0	± 12	ppm	4
	2.Input Resistance		500	-	-	k Ω	
8	SSB Phase Noise	Relative to f_0 level offset 10Hz	-	-	-86	dBc/Hz	
		Relative to f_0 level offset 100Hz	-	-	-110	dBc/Hz	
		Relative to f_0 level offset 1kHz	-	-	-130	dBc/Hz	
		Relative to f_0 level offset 10kHz	-	-	-145	dBc/Hz	
		Relative to f_0 level offset 100kHz	-	-	-145	dBc/Hz	
9	Root Allan Variance	$\text{Tau} = 1\text{ms}$	-	-	0.5	ppb	

3.6.3 ASM + GSM PAM (U1001, SKY77544)

SKY77544 is a transmit and receive Front End Module (FEM) designed in a very low profile (0.9 mm), compact form factor for quad-band cellular handsets comprising GSM850/900, DCS1800, and PCS1900 operation — a complete transmit VCO-to-Antenna and Antenna-to-receive SAW filter solution.

The FEM also supports Class 12 General Packet Radio Service (GPRS) multi-slot operation and EDGE Polar Modulation. WCDMA switch-through support is provided by three dedicated high-linearity ports.

The module consists of a GSM850/900 PA and DCS1800/PCS1900 PA block, impedancematching circuitry for 50 Ω input and output impedances, Tx harmonic filtering, high linearitylow insertion loss switches, and a CMOS Power Amplifier Control (PAC) block.

A custom silicon integrated circuit contains decoder circuitry to control the RF switch while providing a low current external control interface. An integrated temperature sensor provides an analog voltage based on the temperature of the module.

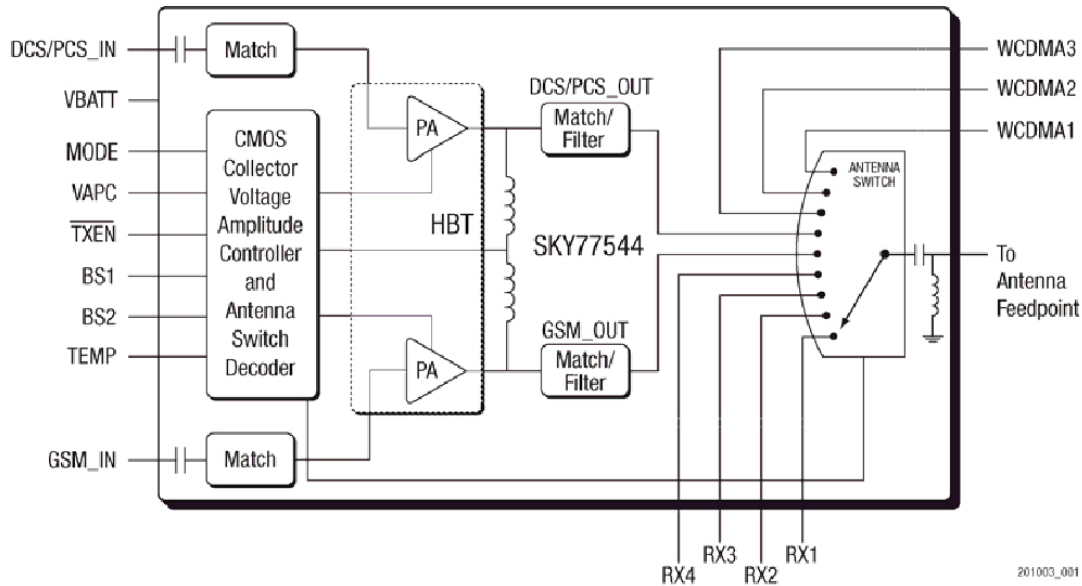
Fabricated in InGaP/GaAs, the Heterojunction Bipolar Transistor (HBT) PA blocks support the GSM850/900 bands and DCS1800/PCS1900 bands. Both PA blocks share common power supply pads to distribute current. The output of the PA block and the outputs to the seven receive pads connect to the antenna pad through a highly linear antenna switch.

The WCDMA and Rx ports feature a 0 volts DC offset level, which eliminates any need for external blocking capacitors. The InGaP/GaAs die, switch die, Silicon (Si) controller die, and passive components are mounted on a multi-layer laminate substrate and the entire assembly is encapsulated with plastic overmold.

RF input and output ports of the SKY77544 are internally matched to a 50 Ω load to reduce the number of external components for a quad-band design. Extremely low leakage current of the FEM maximizes handset standby time. Band selection and control of transmit and receive RF signal flows are performed by use of four external control pads. See Figure 1.9 shown on overleaf.

Mode of operation Tx, Rx, Band (GSM850, GSM900, DCS, PCS, and UMTS) is controlled with 4 logic inputs: BS1, BS2, Mode, and TxEN. Proper timing of the TxEN input and the VAPC input ensures high isolation between the antenna and Tx-VCO while the VCO is being tuned prior to the transmit burst. The Enable input controls the initial turn-on of the PAC circuitry to minimize battery drain.

The integrated power amplifier control (PAC) function provides envelope amplitude control by reducing sensitivity to input drive, temperature, power supply, and process variation.



[Figure 1.9] SKY77544 Block Diagram

Mode	Input Control Bits			
	TxEN	MODE	BS1	BS2
Standby	0	0	0	0
Tx_LOW BAND	0	0	0	1
Tx_HIGH BAND	0	0	1	1
TBD	0	1	0	1
TBD	0	1	1	1
Rx1	1	X	0	0
Rx2	1	X	0	1
Rx3	1	X	1	1
Rx4	1	X	1	0
WCDMA1	0	0	1	0
WCDMA2	0	1	0	0
WCDMA3	0	1	1	0

[Figure 1.10] SKY77544 Control Logic

3.6.4 GPS LNA (U1003, RF2815)

The RF2815 is a GPS Low Noise Amplifier with an integrated SAW filter at the output. Low noise figure, along with high gain, achieved by the RF2815 makes it ideal for GPS receivers requiring high sensitivity. This module builds upon RFMD's leading edge pHEMT process and integrates input matching and low loss high rejection SAW filter at the output. This results in high performance and a reduced solution size. The ease of implementation simplifies the receiver design.

The RF2185 is packaged in a compact 3.3 mm x 2.1 mm x 1.0 mm package with low external component count required to achieve the best-in-class performance.

3.7 Digital Baseband(DBB/MSM7227)

3.7.1 General Description

A. Features(MSM7227)

The basic MSM7227 system solution consists of the MSM7227, RTR6285™, and PM7540™ ICs, plus AMSS™ system software with the SURF7227™ platform available for development. General features include:

- WCDMA Rel'99 plus HSDPA and HSUPA
- GSM/GPRS/EDGE
- High-performance ARM1136JF-S™ application processor at up to 600 MHz; QDSP5000™ at 320 MHz
- High-performance ARM926EJ-S™ modem processor at up to 400 MHz; QDSP4000™ at 122.88 MHz
- Java® hardware acceleration for faster Java-based games and other applets
- Support for Bluetooth® 2.1 EDR via an external Bluetooth System-on-Chip (SoC)
- High-speed, serial mobile display digital interface (MDDI) that optimizes the interconnection cost between the MSM device and the LCD panel
- Receive diversity support for WCDMA mode, thereby providing improved capacity and data throughput
- USB 2.0 compliant high-speed USB core with limited OTG capabilities
- Integrated high-speed USB PHY
- Integrated wideband stereo codec for digital audio applications
- Direct interface to digital camera module with video front-end (VFE) image processing
- GPS position location capabilities
- Vocoder support (GSM-HR, FR, EFR, AMR, and AMR-WB/+)
- Advanced 12 × 12 × 1.05 mm, 0.4 mm pitch, 560 NSP

3.8 Hardware Architecture

<System HW Block>

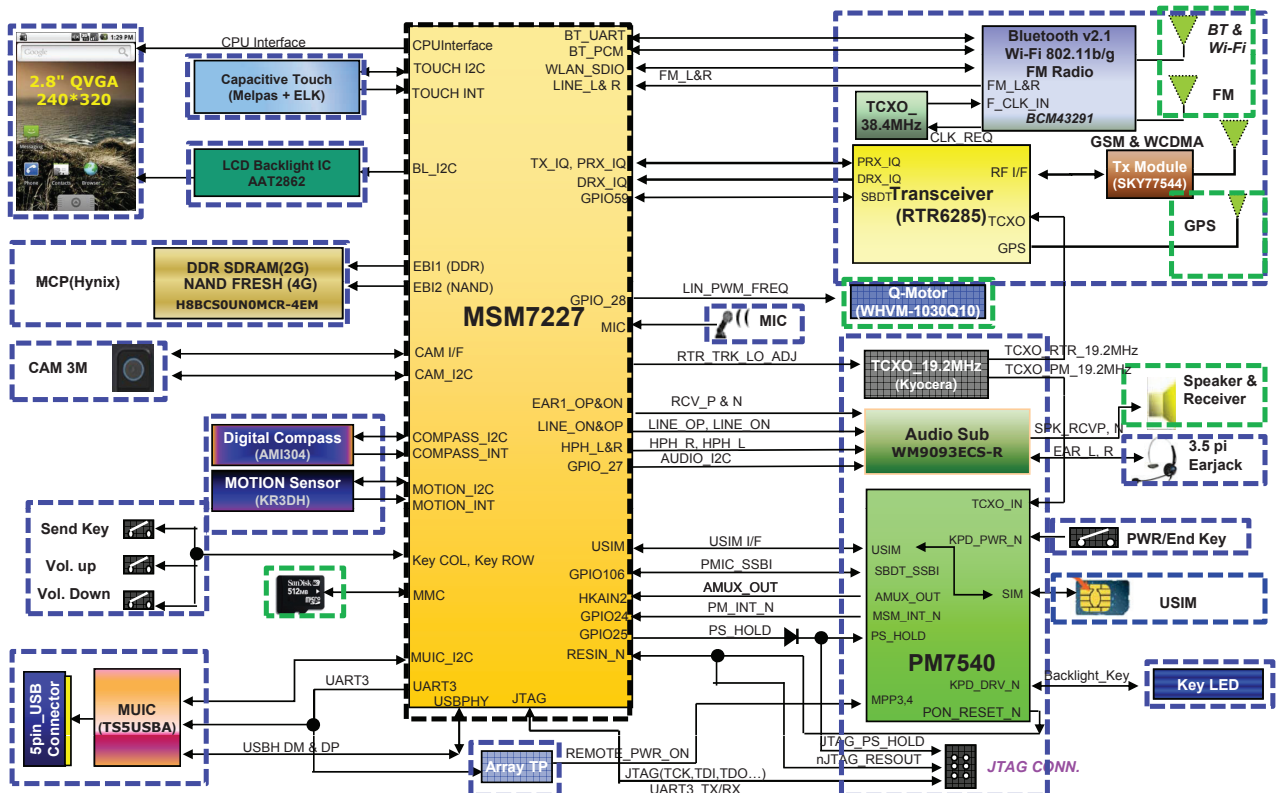


Figure. Block Diagram

<Power Block>

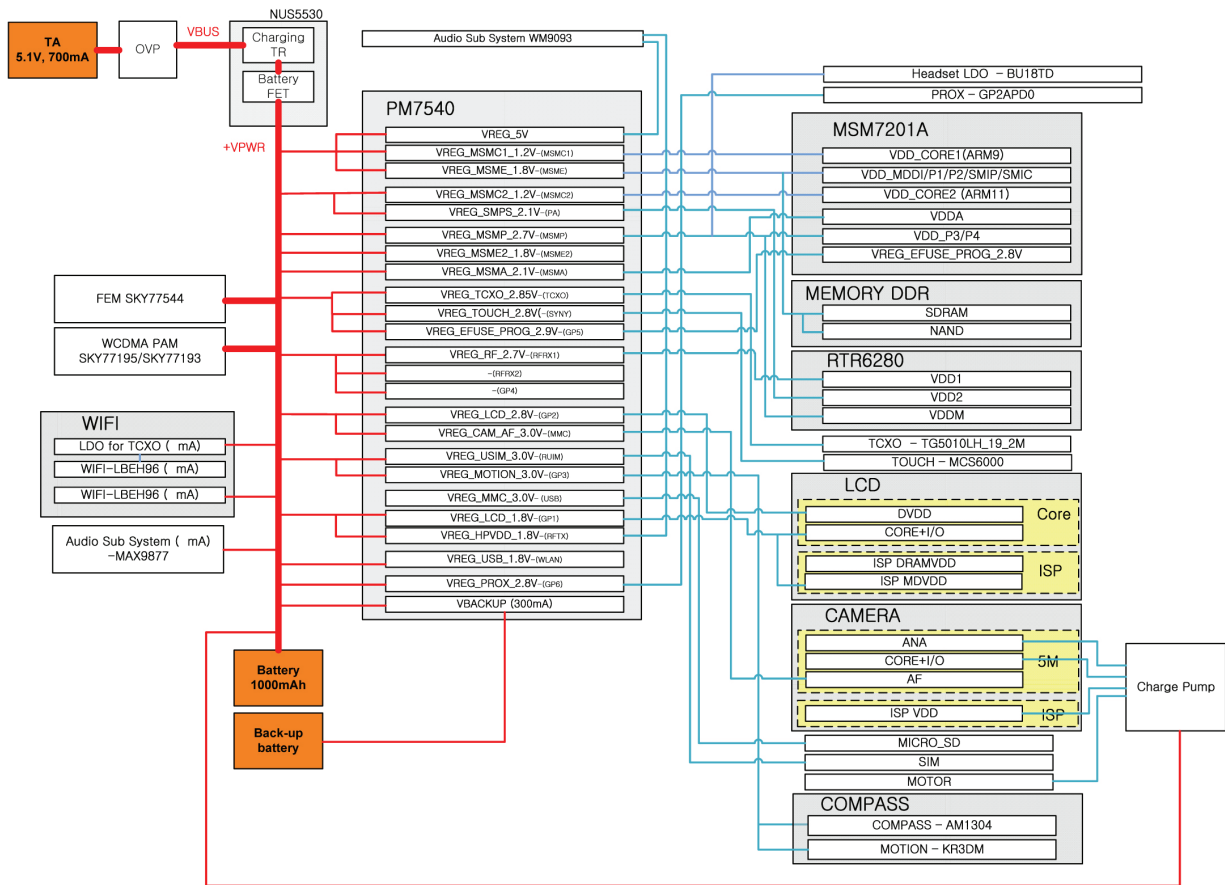


Figure. Simplified Block Diagram

3.9 Subsystem (MSM7227)

3.9.1. ARM Microprocessor Subsystem

The MSM7227 device uses an embedded ARM1136JF-S, ARM926EJ-S microprocessor. This microprocessor, through the system software, controls most of the functionality for the MSM, including control of the external peripherals such as the keypad, LCD, SDRAM, and NANDFlash devices. Through a QUALCOMM proprietary single-wire SBI (SSBI) the ARM926EJ-S configures and controls the functionality of the RTR6285 and PM7540 devices.

3.9.2. WCDMA Subsystem

The WCDMA subsystem performs the data conversions and signal processing necessary to maintain the WCDMA air interface between the handset and the base station (and also the WCDMA network). The subsystem components include:

- Searcher engine
- Demodulating fingers
- Combining block
- Frame deinterleaver
- Viterbi decoder
- Reverse link subsystem
- Turbo decoder

On the forward link traffic channel, the WCDMA subsystem searches, demodulates, and decodes incoming pilot, sync, paging, and traffic channel information. It extracts low bit-rate packet data from the forward link traffic channel and sends the packet data to the vocoder for processing. On the reverse link, the WCDMA subsystem processes the packet data from the vocoder and modulates the reverse traffic channel.

3.9.3. GSM Subsystem

The GSM subsystem performs the data conversions and signal processing necessary to maintain the GSM air interface, including PA gain control for GPRS support. For GSM, the power profile ramps up before the burst and ramps down afterward. For GPRS, transmit bursts can occur in as many as four sequential slots and the PA must be ramped up and down smoothly between each slot, holding the desired output power level during each burst. GSM support includes:

- GSM release '99 (circuit switching)
- GPRS (packet switching)
- EDGE E2 power class for 8 PSK

3.9.4. RF Interface

The RF interface communicates with the mobile station's external RF and analog baseband circuits. Signals to these circuits control signal gain in the Rx and Tx signal path and maintain The system's frequency reference.

3.9.5. Single-wire serial bus interface (SSBI)

The MSM7227 device's SSBI is designed specifically to be a quick, low pin count control protocol for QUALCOMM's RTR6285 and PM7540 ASICs. Using the SSBI, the RTR6285 and PM7540 devices can be configured for different operating modes and for minimum power consumption, extending battery life in Standby mode. The SBI also controls DC baseband offset errors.

3.9.6. Audio function

MSM7227 audio functions include the analog Rx and Tx paths (or stereo wideband codec), audio digital signal processing (DSP) that provides adjustable gains and filtering, PCM circuits for interfacing with external devices, and additional audio DSP that actually implements encoding and decoding. Other key features include:

- The wideband codec supports stereo music/ringer melody applications in addition to the 8 kHz voice band applications on the forward link.
- A PCM interface allows an external codec to be used instead of the internal codec; this supports inter-IC Sound (I2S) modes that allow an external stereo DAC or SADC to be used.
- Currently in AMSS baseline only I2S output mode is supported (SDAC-only, no SADC support).
- Audio decoder summing and headset switch detection are included.
- Audio DSP includes the Rx and Tx filters needed to meet ITU-T G.712 requirements.
- A programmable sidetone path provides for summing part of the Tx audio into the Rx path.
- Many codec parameters are configurable via SBI registers.
- The audio processing is configured through QDSP5 command types and is not directly controlled by the microprocessor.

3.9.7. Vocoder Subsystem

The MSM7227 device's QDSP4000 supports AMR,FR,EFR and HR. In addition, the QDSP4000 has modules to support the following audio functions: DTMF tone generation, DTMF tone detection, Tx/Rx volume controls, Tx/Rx automatic gain control (AGC), Rx Automatic Volume Control (AVC), EarSeal Echo Canceller (ESEC), Acoustic Echo Canceller (AEC), Noise Suppression (NS), and programmable, 13-tap, Type-I, FIR, Tx/Rx compensation filters. The MSM7227 device's integrated ARM9TDMI processor downloads the firmware into the QDSP4000 and configures QDSP4000 to support the desired functionality.

3.9.8. Mode Select and JTAG Interfaces

The mode pins to the MSM7227 device determine the overall operating mode of the ASIC. The options under the control of the mode inputs are Native mode, which is the normal subscriber unit operation, ETM mode, which enables the built-in trace mode, and test mode for factory testing. The MSM7227 device meets the intent of the ANSI/IEEE 1149.1A-1993 feature list. The JTAG interface can be used to test digital interconnects between devices within the mobile station during manufacture.

3.9.9. General-Purpose Input/Output Interface

The MSM7227 IC includes 133 general purpose input/output (GPIO) pins, and each can be configured as a digital input or digital output. Inputs can be set to have a pull-up, pull-down, keeper, or no-pull. Output drive strength is also programmable. Software assigns functions to the GPIOs and their configurations are set accordingly. Some of the GPIO pins have alternate functions supported on them. The alternate functions include USB interface, additional RAM, ROM, general-purpose chip selects, parallel LCD interface, and a UART interface. The function of these pins is documented in the various software releases.

3.9.10. UART

The MSM7227 device employs three UARTs. UART1 has dedicated pins while UART2 and UART3 share multiplexed pins.

- UART1 for Bluetooth
- UART2 for USIM interface
- UART3 for data

3.9.11. USB

The MSM7227 IC supports one High Speed USB (HS-USB) USBH port with built-in PHY and one Full Speed USB-UICC port. The MSM7227 IC supports USB interfaces using two controllers:

- The primary controller is the HS-USB port with an integrated physical layer (PHY). This HS-USB port is also capable of supporting USB operations at low-speed and full-speed.
- The secondary controller is the FS USB-UICC port, which only supports host mode functionality.

3.10 Power Block

3.10.1. General

MSM7227, included RF, is fully covered by PM7540 (Qualcomm PMIC). PM7540 cover the power of MSM7227, MSM memory, RF block, Bluetooth, USIM and TCXO.

Major power components are :

PM7540 (U403) : Phone main PMIC

3.10.2 PM7540

The PM7540 device (Figure) integrates all wireless handset power management. The power management portion accepts power from all the most common sources – battery, external charger, adapter, coin cell back-up – and generates all the regulated voltages needed to power the appropriate handset electronics.

It monitors and controls the power sources, detecting which sources are applied, verifying that they are within acceptable operational limits, and coordinates battery and coin cell recharging while maintaining the handset electronics supply voltages.

Eight programmable output voltages are generated using low dropout voltage regulators, all derived from a common trimmed voltage reference.

A dedicated controller manages the TCXO warm-up and signal buffering, and key parameters (under-voltage lockout and crystal oscillator signal presence) are monitored to protect against detrimental conditions. MSM device controls and statuses the PM7540 IC using Single-wire SBI(SSBI) supplemented by an Interrupt Manager for time-critical information.

Another dedicated IC Interface circuit monitors multiple trigger events and controls the power-on sequence.

3. TECHNICAL BRIEF

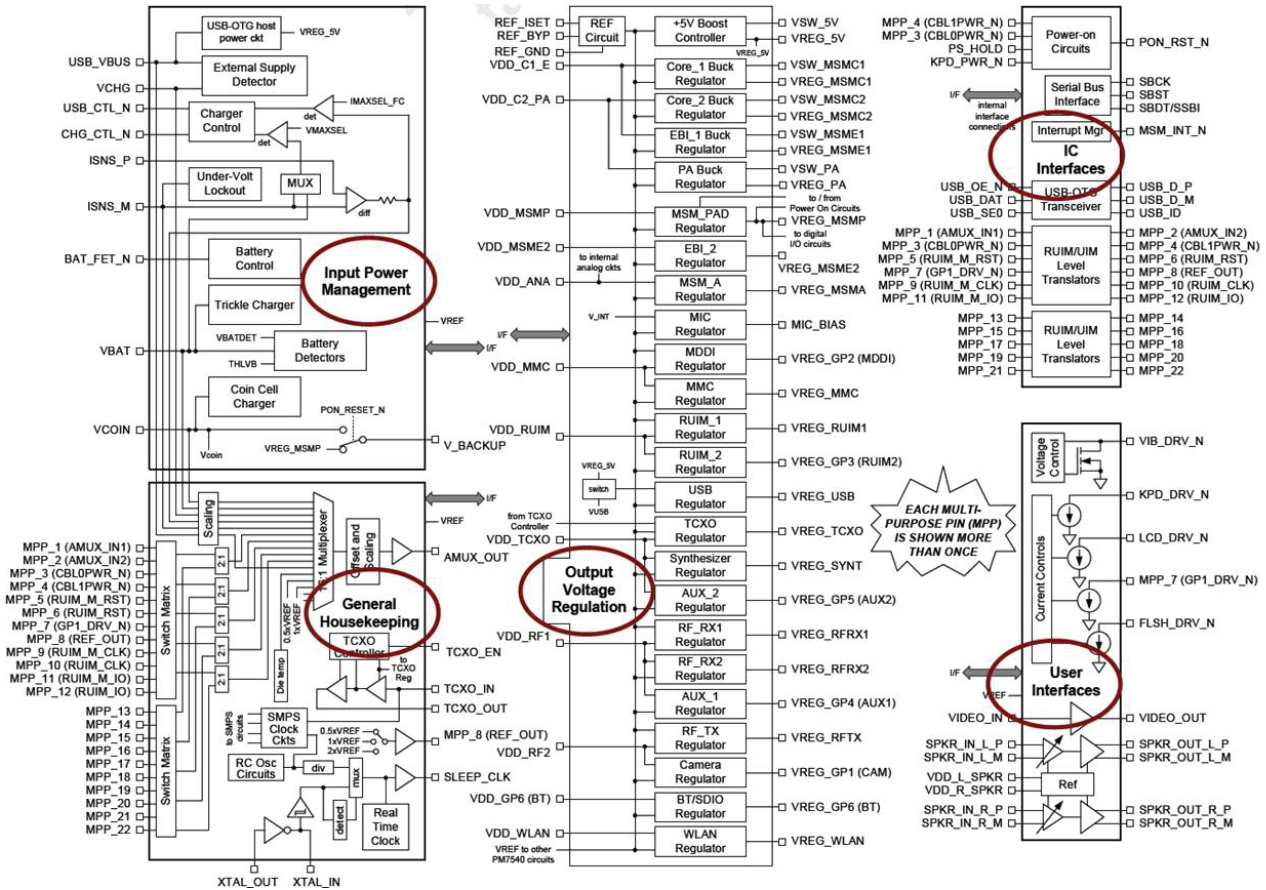


Figure. PM7540 functional block diagram

3.10.3. Charging control

A programmable charging block in PM7540 is used for battery charging. It is possible to set limits for the charging current. The external supply typically connects directly to pin (VCHG). The voltage on this pin (VCHG) is monitored by detection circuitry to ascertain whether a valid external supply is applied or not. For additional accuracy or to capture variations over time, this voltage is routed internally to the housekeeping ADC via the analog multiplexer.

PM7540 circuits monitor voltages at VCHARGER and ICHARGE pins to determine which supply should be used and when to switch between the two supplies. These pins are connected to the Source (or emitter) and Drain (or collector) contacts of the pass transistor respectively.

3.10.3.1. Trickle Charging

Trickle Charging of the main battery, enabled through SBI control and powered from VDD, is provided by the PM7540 IC. The trickle charger is on-chip programmable current source that supplies current from VDD to pin (VBAT). Trickle charging can be used for lithium-ion and nickel-based batteries, with its performance specified below (3.2V). The charging current is set to 80mA.

Parameter	Min	Typ	Max	Unit
Trickle Current	60	80	100	mA

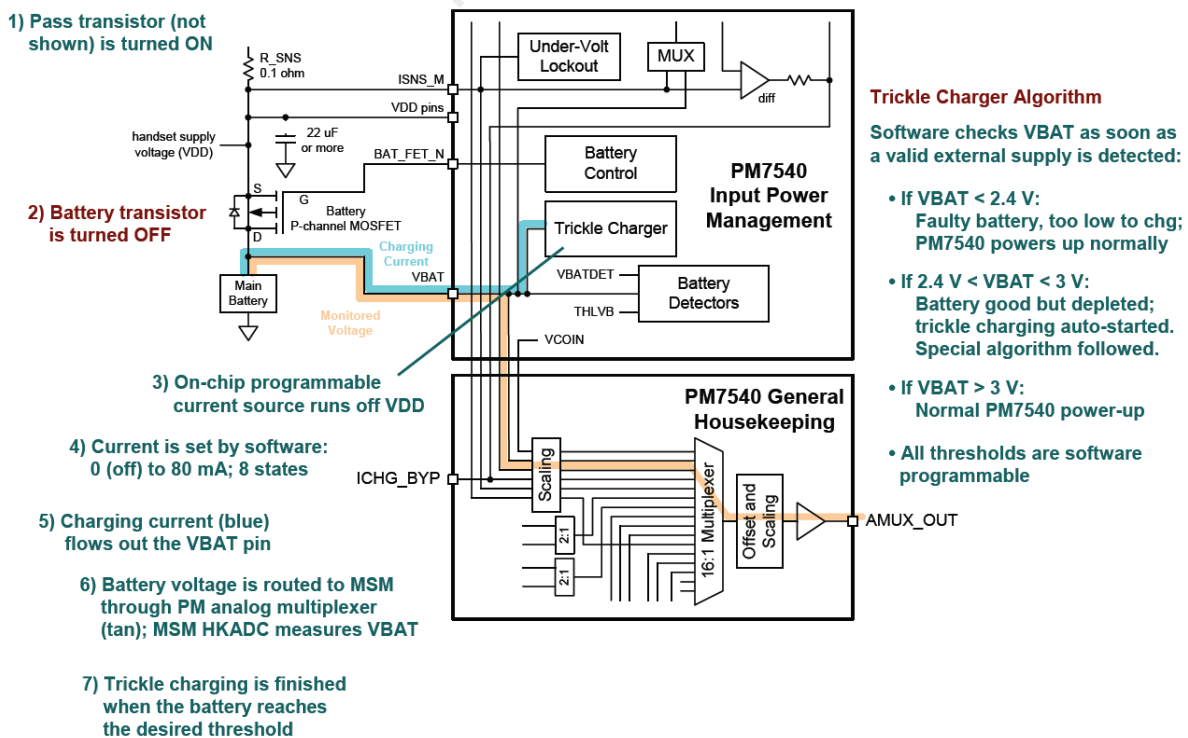


Figure. PM7540 Charging Flow (TC Charging)

3.10.3.2. Constant Current Charging

The PM7540 IC supports constant current charging of the main battery by controlling the charger pass transistor and the battery transistor. The constant current charging continues until the battery reaches its target voltage, 4.2V.

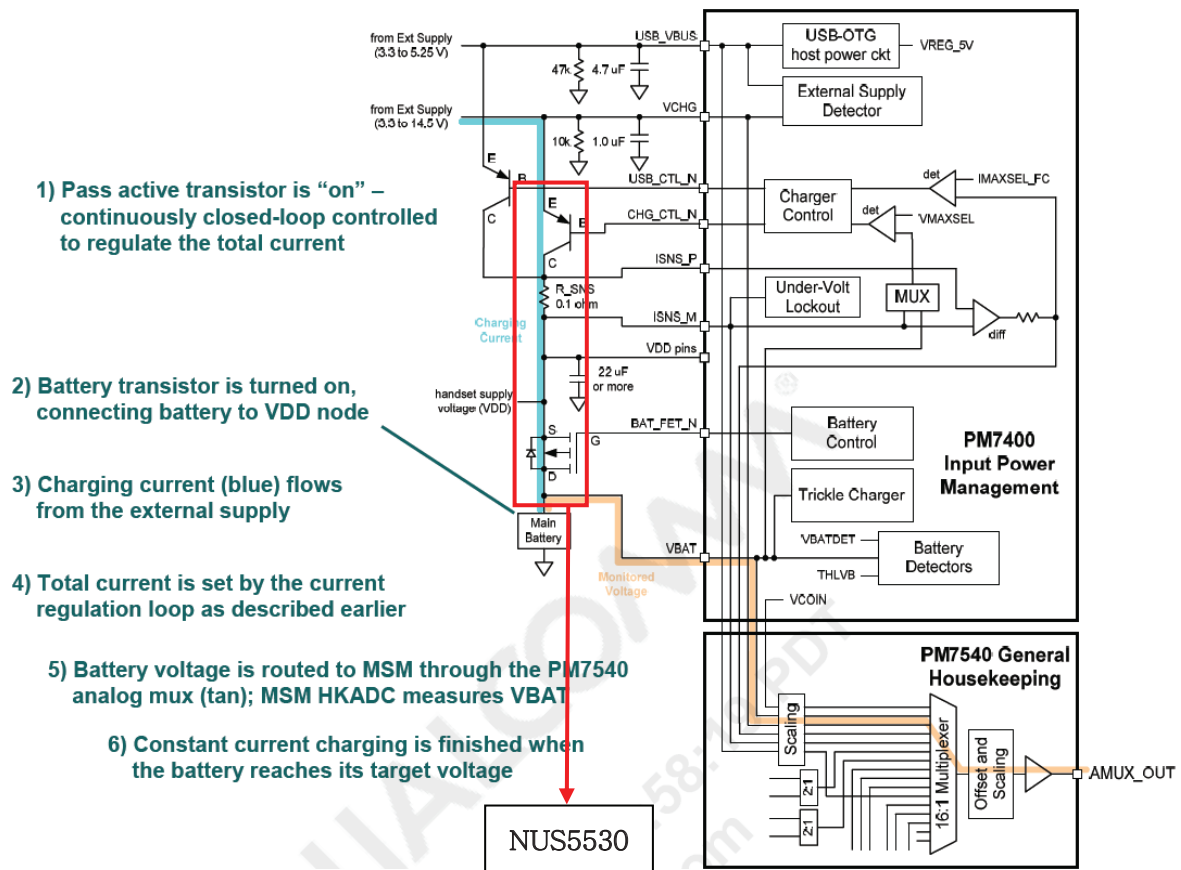


Figure. PM7540 Charging Flow (CC Charging)

3.10.3.3. Constant Voltage Charging

Constant voltage charging begins when the battery voltage reaches a target voltage, 4.2V.
The end of constant voltage charging is commonly detected 10% of the full charging current.

3.10.3.4. LGP350 Charging Specification

- Charging Method : CC & CV (Constant Current & Constant Voltage)
- Maximum Charging Voltage : 4.2V
- Maximum Charging Current : 700mA
- Nominal Battery Capacity : 1280mAh
- Charging time : Max. 3h
- Full charge indication current (icon stop current) : 50mA

3.10.3.5. LGP350 battery bar icon display

Battery Bar Number	Specification	
BAR 6 (Full)	90% over	Remain %
BAR 6 --> 5	90% → 89%	
BAR 5 --> 4	70% → 69%	
BAR 4 --> 3	50% → 49%	
BAR 3 --> 2	30% → 29%	
BAR 2 --> 1	15% → 14%	
BAR 1 --> 0	5% → 4%	
Low Battery Pop-up	4% ~ 15% : One Time popup (No call)	
Critical Low Battery Pop-up	0% ~ 3% : Level change마다 popup (No call)	
POWER OFF	0%	

Table. LG-P350 battery bar specification

3.11 External memory interface

3.11.1. MSM7227

The MSM7227 device was designed to provide two distinct memory interfaces. EBI1 was targeted for supporting DDR synchronous memory devices. EBI2 was targeted towards supporting slower asynchronous devices such as LCD, NAND flash, SRAM, NOR flash etc. To support the high-bandwidth, high-density, and low-latency requirements of the advanced on-chip applications, the MSM7227 IC has two high-speed, high-performance memory slave interfaces: the external bus interface 1 (EBI1) and the stack memory interface (SMI). To achieve higher bandwidth and better use of the memory device interface, the SMI accepts multiple commands for the external memory

device. The SMI interface acts as a slave device to all of the bus masters within the MSM device. The masters arbitrate to gain access to the SMI, and upon obtaining the access, they issue commands to the SMI. The bus masters are connected to the SMI through an advanced extensible interface (AXI) bus bridge (or global interconnect block) and communicate over a 64-bit, non-blocking AXI bus protocol. The AXI bus bridge provides the arbitration logic for all of the bus masters.

EBI1 Features

- Support for only low-power memories at 1.8-V I/O power supply voltage
- AXI bus frequencies up to 133 MHz
- A 16-bit/32-bit static and dynamic memory interface

DDR SDRAM interface features include:

- Supports both 32-bit DDR SDRAM devices, up to 133-MHz bus speed
- Supports auto precharge and manual precharge
- Supports partial refresh
- Separate CKE pin per chip-select to support partial operation mode
- Idle power down to save idling power consumption

EBI2 Features

- Support for asynchronous FLASH and SRAM(16bit & 8bit).
- Interface support for byte addressable 16bit devices(UB_N & LB_N signals).
- 2Mbytes of memory per chip select.
- Support for 8 bit/16bit wide NAND flash.
- Support for parallel LCD interfaces, port mapped of memory mapped(8 or 16 bit)

3.11.2.LG-P350 External memory Interface

- Multi Chip Package : DDR SDRAM and NAND Flash merged 1 package
- 2Gbit Mobile DDR SDRAM / 4Gbit NAND Flash

Interface Spec				
Part Name	Product Gr	Maker	Operation Voltage	Speed
H8BCS0UN0MCR-4EM	NAND	HINIX	1.8V	42ns
	SDRAM		1.8V	200MHz

3.12 H/W Sub System

3.12.1. RF Interface

3.12.1.1. RTR6285 (WCDMA_Tx, GSM_Tx/Rx)

MSM7227 controls RF part(RTR6285) using these signals.

- RTR6285_SSBI : SSBI I/F signals for control Sub-chipset
- RTR_TXON : Power AMP on RF part
- RTR_RX_I/Q_M/P, RTR_TX_I/Q_M/P : I/Q for T/Rx of RF
- RTR_DAC_REF : Reference input to the MSM Tx data DACs

3.12.1.2. the others

TRK_LO_ADJ : TCXO(19.2M) Control

PA_ON0/PA_RANGE0 : WCDMA(2100) TX Power Amp Enable

ANT_SEL[0-3] : Ant Switch Module Mode Selection(WCDMA,GSM Tx/Rx,DCS-PCS Tx/Rx)

GSM_PA_RAMP : Power Amp Gain Control of APC_IC

3.12.1.3. RF2815 (GPS LNA)

* GPS_LNA_EN : GPS LNA Enable Signal (GPS LNA Shutdown)

3.12.1.4. BCM43291SKUBG (BT / WiFi chip)

WiFi

- * WLAN_CMD : WLAN SDIO Command Line.
- * WLAN_CLK : WLAN SDIO Clock Input.
- * WLAN_SDIO[3:0] : WLAN SDIO Data Line.
- * WLAN_RESET_N : Low asserting reset for WLAN core.
- * WLAN_WAKEUP : WLAN Wakeup Input.
- * WLAN_HOST_WAKEUP : WL_HOST_WAKEUP signal output.

BT

- * BT_UART_RXD : Bluetooth UART Serial Input.
- * BT_UART_RTS : Bluetooth UART Request to Send. Active-low request.
- * BT_UART_CTS : Bluetooth UART Clear to Send. Active-low clear.
- * BT_UART_TXD : Bluetooth UART Serial Output.
- * BT_PCM_CLK : BT PCM clock, can be PCM-master (output) or PCM-slave (input).
- * BT_PCM_DIN : BT PCM data input.
- * BT_PCM_SYNC : BT PCM sync signal, can be PCM-master (output) or PCM-slave (input).
- * BT_PCM_DOUT : BT PCM data output.
- * BT_WAKEUP : BT Wakeup Input.
- * BT_HOST_WAKEUP : BT Host Wakeup Output
- * BT_RESET_N : Low asserting reset for BT core.

Common

- * SLEEP_CLK : LPO clock (32.768kHz) input. Used for low-power mode timing.
- * CLK_IN : Crystal amplifier input or frequency reference input.
- * CLK_REQ : Crystal Circuit / Reference Clock Enable (active-high)

FM Radio

- * FM_ANT : FM RF input.
- * SLEEP_CLK : External reference oscillator input. (32.768KHz)
- * FM_R : Right audio line output – digital input data.
- * FM_L : Left audio line output – digital frame synchronization.

3. TECHNICAL BRIEF

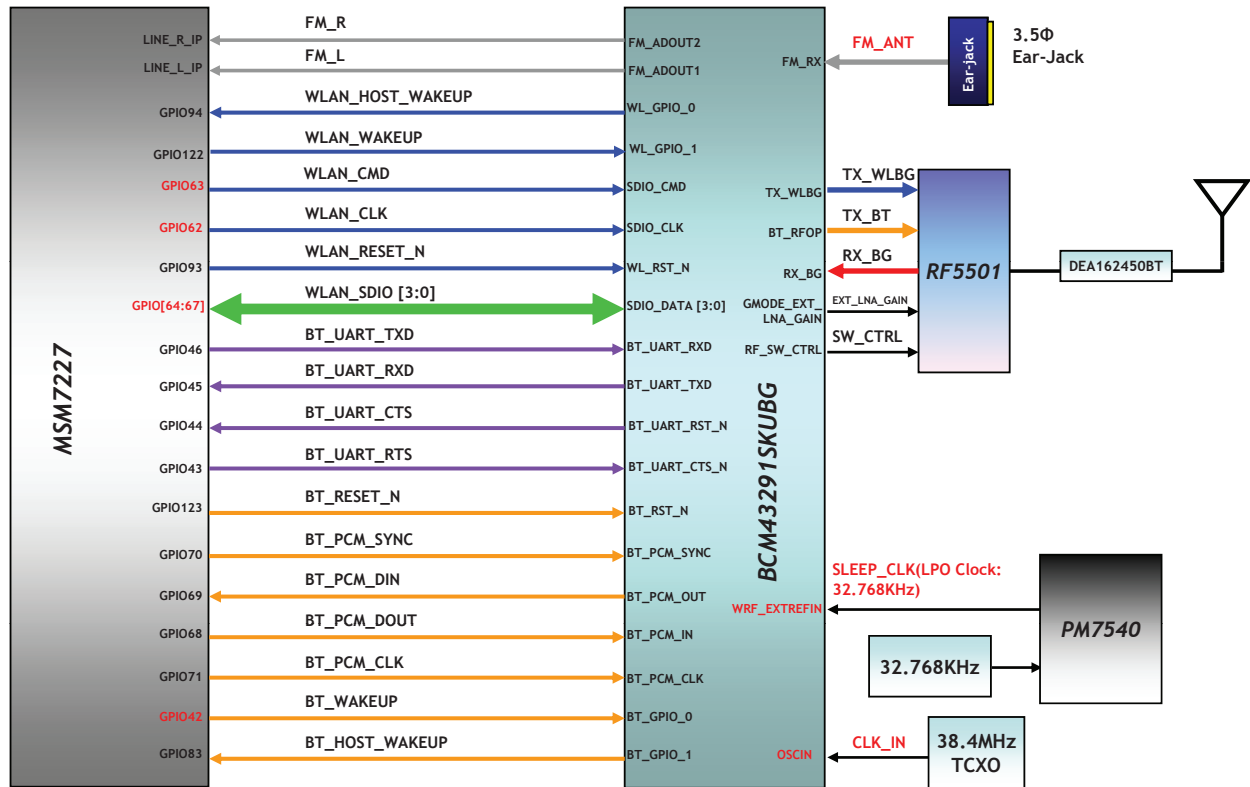


Figure. Wifi/BT/FM Interface Block Diagram

3.12.2 MSM Sub System

3.12.2.1. USIM Interface

SIM interface scheme is shown in Figure.

And, there control signals are followed

- USIM_CLK : USIM Clock
- USIM_Reset : USIM Reset
- USIM_Data : USIM Data T/Rx

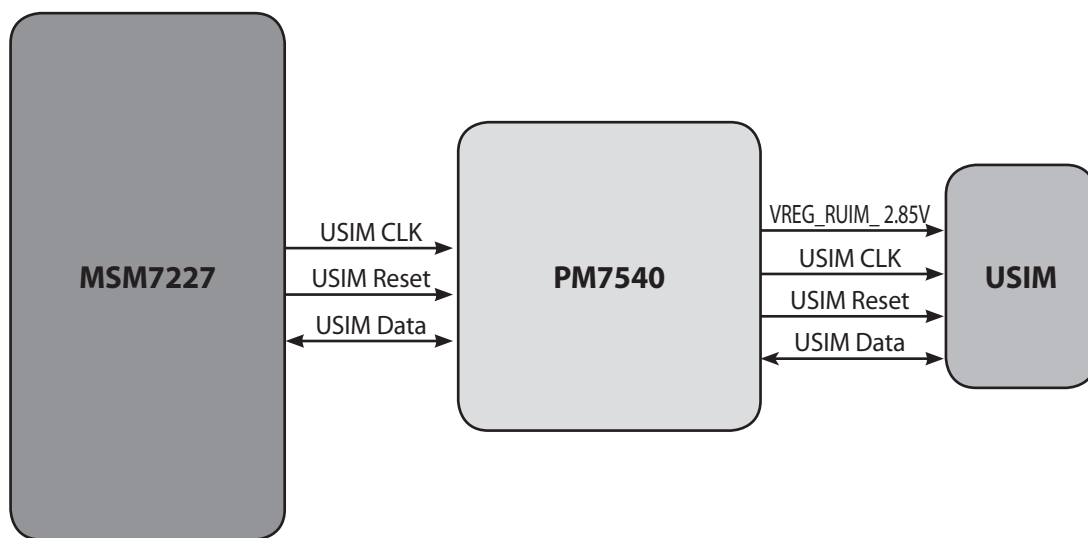


Figure. SIM Interface

3.12.2.2. UART Interface

UART signals are connected to MSM GPIO through IO connector with 115200 bps speed.

GPIO_Map	Name	Note
GPIO_86	UART3_RX	Data_Rx
GPIO_87	UART3_TX	Data_Tx

Table. UART Interface

3.12.2.3. HS-USB

The High-Speed USB module contains an embedded UTMI+ core with a built-in transceiver eliminating the need for an external PHY. The HS-USB port is a standard 4-pin interface that connects directly to the USB connector (USBPHY_DP, USBPHY_DN, USBPHY_ID and USBPHY_VBUS).

Two additional pins are required for PHY operations which include an external reference resistor pin (USBPHY_REXT) and a USB system clock pin which the USB PHY uses to lock its internal PLL (SYS_CLK).

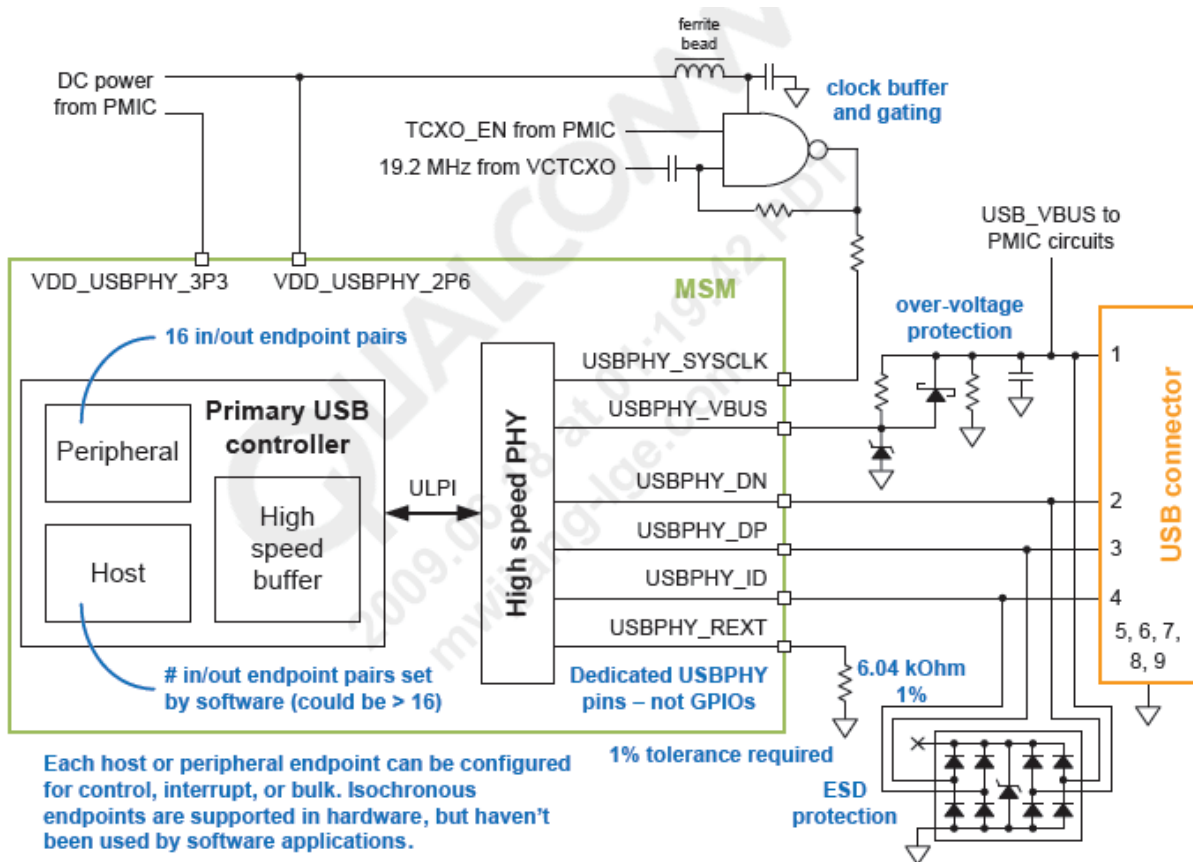


Figure. HS-USB connections and architecture

3.12.3 KEY

3.12.3.1 Side key

There are 2 side key , Send, and END buttons that are controlled by MSM7227.

Refer to the circuit.

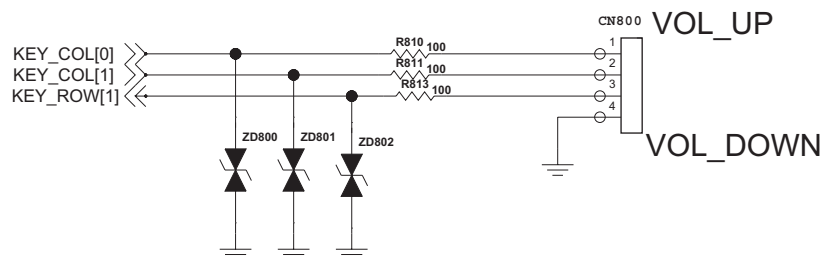


Figure. Volume Side key

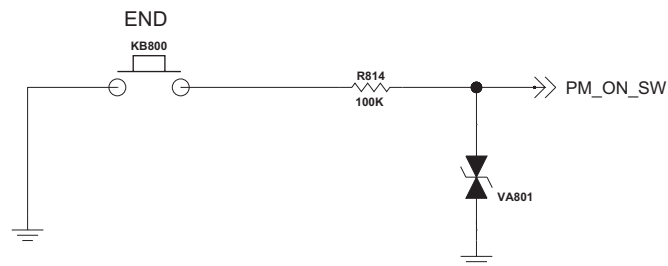


Figure. End key

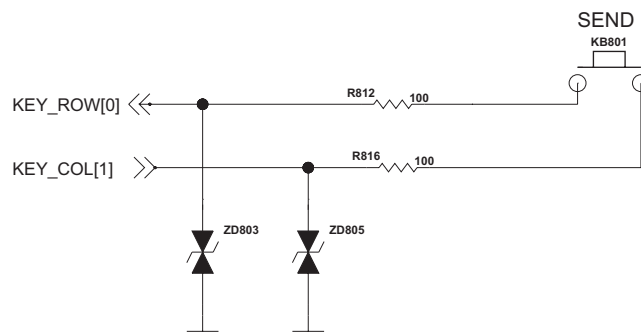


Figure. Send key

3.12.3.3 KEY Backlight

There are 2 White side view LED, 2 white LED in key backlight circuit

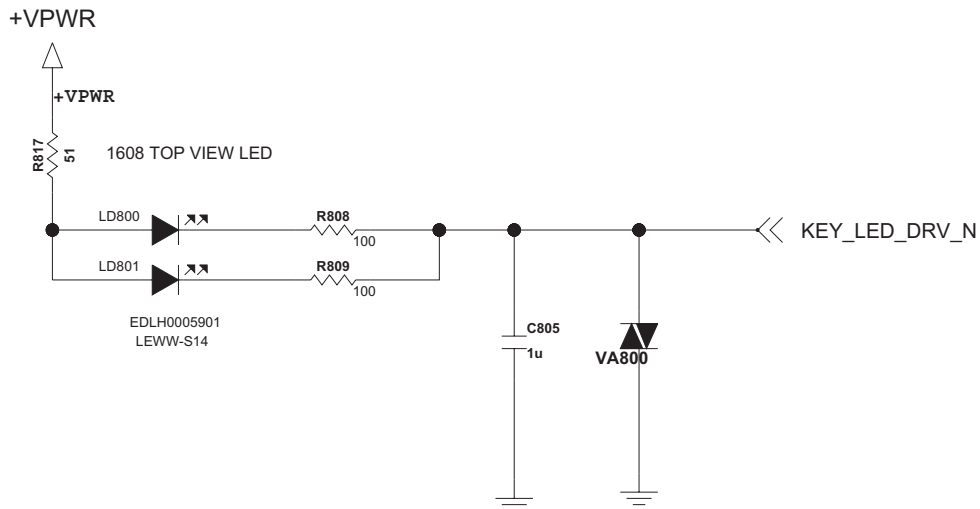


Figure. KEY Backlight

3.13 Audio and sound

3.13.1. Overview of Audio path

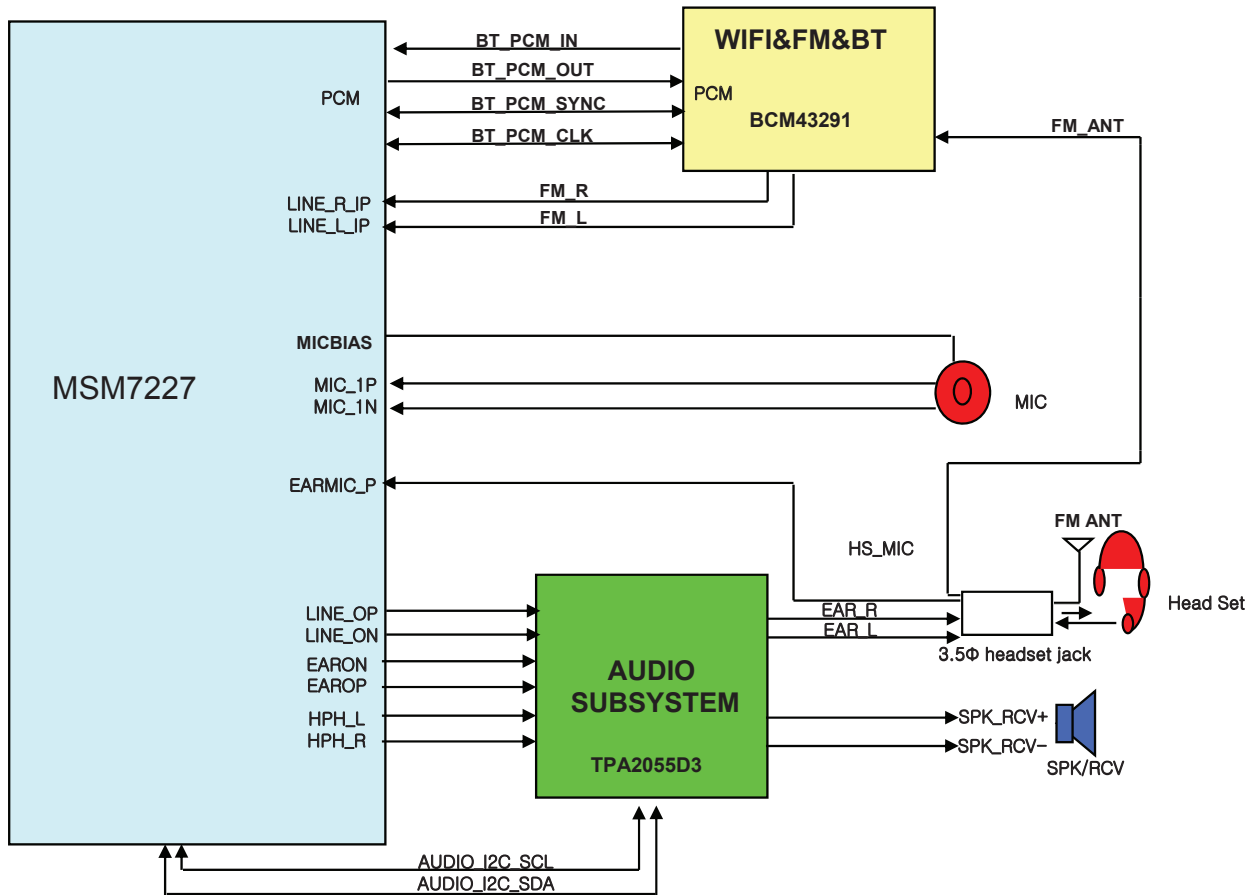


Figure. Block diagram of Audio & Sound path

3.13.2. Audio signal processing & interface

3.13.2.1 MSM7227 audio interface

The MSM7227 audio front end comprises the stereo wideband codec, PCM interface, and additional DSP audio processing. The stereo wideband codec allows the MSM7227 device to support stereo music/ringer melody applications in addition to the 8 kHz voice band applications on the forward link.

In the audio transmit path, the device operates as 13-bit linear converter with software, selectable 8 kHz and 16 kHz sampling rate. In the audio receive path, the device operates as a software-selectable 13-bit or 16-bit linear converter with software selectable 8 kHz, 16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz, or 48 kHz sampling rate.

Through software, the Rx path can be configured as either a mono or stereo output. New to the MSM7227 device is a transmit (Tx) ADC path that now supports stereo wideband sampling.

The integrated codec contains all of the required conversion and amplification stages for the audio front end. The codec operates as a 13-bit linear codec with the transmit (Tx) and receive (Rx) filters designed to meet ITU-T G.712 requirements.

The codec includes a programmable side tone path for summing a portion of the Tx audio into the Rx path. An on-chip voltage/current reference is provided to generate the precise voltages and currents required by the codec. This circuit requires a single capacitor of 0.1 μ F to be connected between the CCOMP and GND pins. The on-chip voltage reference also provides a microphone bias voltage required for electret condenser microphones typically used in handset applications. The MICBIAS output pin is designed to provide 1.8 V DC while delivering as much as 1 mA of current.

Audio decoder summing and headset switch detection are included. The codec interface includes the amplification stages for both the microphone and earphone. On the transmit (Tx) path, the interface supports two differential microphone inputs, a differential auxiliary input, and a stereo line input. On the receive (Rx) path the interface supports one differential earphone output, a stereo single-ended headphone output, one differential auxiliary output, and stereo single-ended line outputs. The codec is configured by the codec SBI registers. The codec interface is shown in Figure.

Also part of the audio front end is the PCM interface. The PCM interface allows for an external codec to be used instead of the internal codec. This interface can be used in I2S mode which will allow for an external stereo DAC to be used. Finally, the audio front end includes additional DSP audio processing that does gains, filtering and other audio processing.

The DSP audio processing is configured through the QDSP5000 command types and is not directly controlled by the microprocessor.

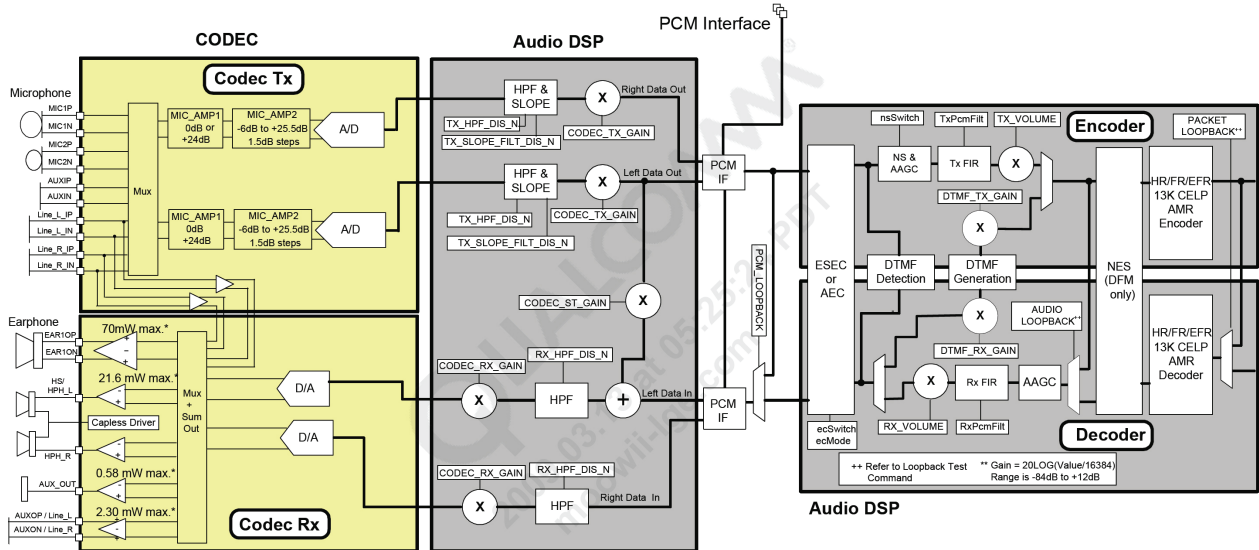


Figure. Detailed diagram of MSM7227 audio interface

3.13.2.2 TPA2055D3 audio interface

The TPA2055D3 is an audio subsystem with a mono class-D power amplifier, a stereo class-G DirectPath™ headphone amplifier, and bypass switches. Class-G improves MP3 playback time while DirectPath eliminates the need for external dc-blocking output capacitors. The headphone amplifier drives up to 35mW into 16-ohm speakers from a 1.8-V supply.

The subsystem includes two stereo single-ended (SE) inputs. The stereo inputs are also configurable as differential mono inputs. Each input channel has an independent volume control. Inputs can be individually selected or mixed together. Input impedances remain constant over all input and output gains.

Operating mod and volume levels are controlled over an I²C interface. The I²C interface is compatible over a 1.5V to 5.5V digital supply range.

The TPA2055D3 uses SpeakerGuard™ Limiter technology to prevent output clipping distortion and excessive power to the speakers and headphones. The speaker and headphone amplifier outputs have independent limiter levels, allowing optimum loudness and protection for each output.

The TPA2055D3 is available in a 0.5 mm pitch 20-bump WCSP with less than 0.8 mm height.

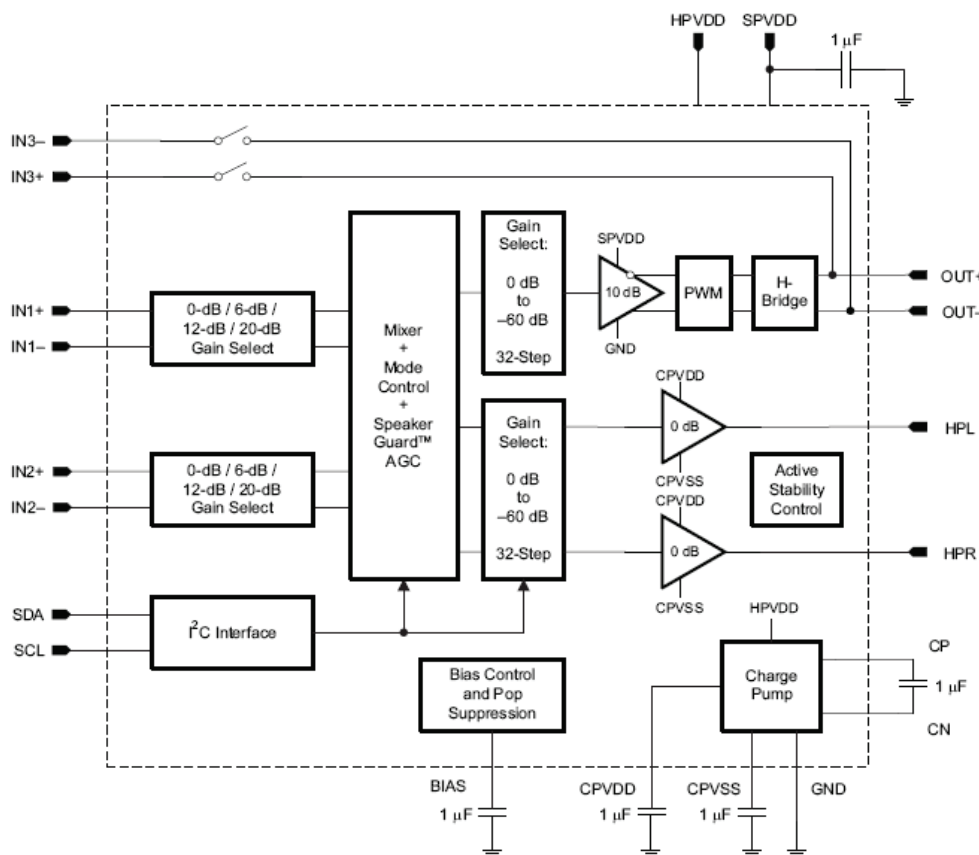
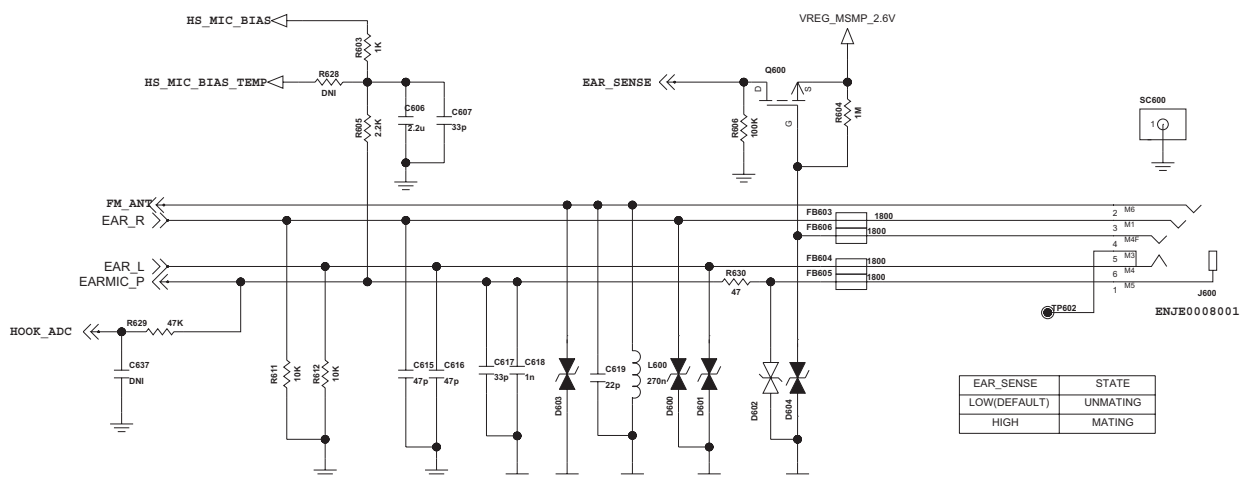
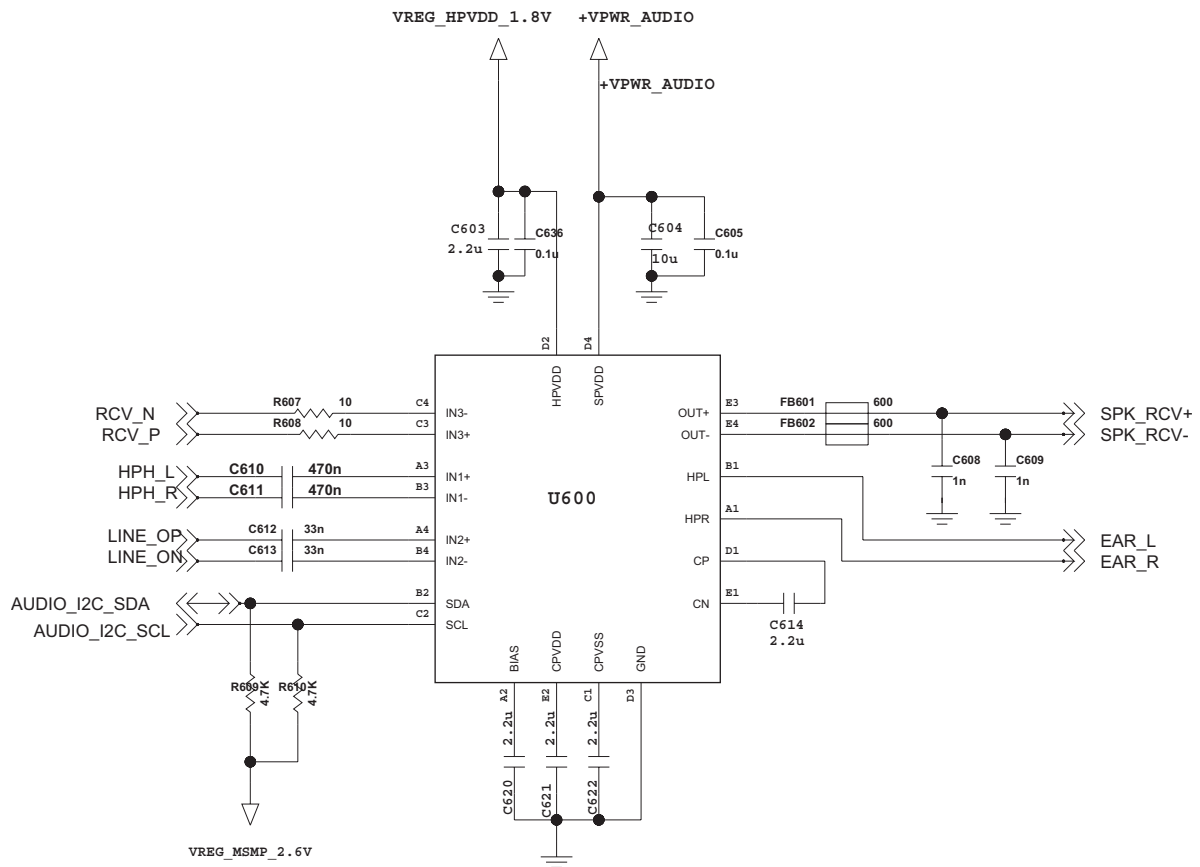


Figure. Detailed diagram of TPA2055D3 audio interface

MIC



Audio SUB SYSTEM



LCD module is connected to Main PCB with 40-pin connector.
The LCD is controlled by CPU Interface in MSM7227.

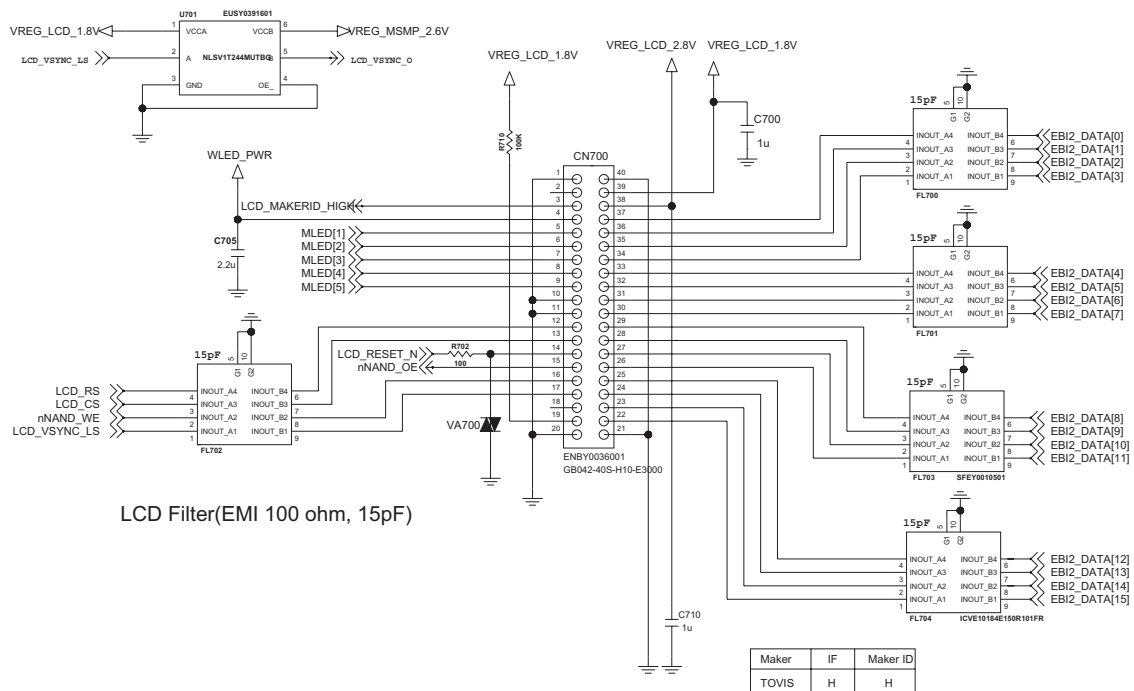


Figure. Schematic of LCD connector (Main Board)

3. TECHNICAL BRIEF

Pin No.	Pin Name	I/O	Description
1	GND	-	Ground
2	VDDIO	I	Power Supply for LDI and LCM (I/O)
3	VCC	I	Power Supply for LDI and LCM (Logic & ANALOG)
4	D0	I/O	Bi-Direction Data Bus
5	D1	I/O	Bi-Direction Data Bus
6	D2	I/O	Bi-Direction Data Bus
7	D3	I/O	Bi-Direction Data Bus
8	D4	I/O	Bi-Direction Data Bus
9	D5	I/O	Bi-Direction Data Bus
10	D6	I/O	Bi-Direction Data Bus
11	D7	I/O	Bi-Direction Data Bus
12	D8	I/O	Bi-Direction Data Bus
13	D9	I/O	Bi-Direction Data Bus
14	D10	I/O	Bi-Direction Data Bus
15	D11	I/O	Bi-Direction Data Bus
16	D12	I/O	Bi-Direction Data Bus
17	D13	I/O	Bi-Direction Data Bus
18	D14	I/O	Bi-Direction Data Bus
19	D15	I/O	Bi-Direction Data Bus
20	GND	-	Ground
21	GND	-	Ground
22	IF MODE0	I	Selection of Data Bus (8Bit or 16bit) . Note 1)
23	N.C	-	No connection
24	VSYNC_O	O	Out put of frame synchronization signal
25	WRB	I	Write-Strobe Signal. Active low
26	RDB	I	Read-Strobe Signal, Active low
27	RESETB	I	Reset Pin. Initialize the LSI at the low level
28	CSB	I	Chip Select. Active low
29	RS	I	Select the Register. High : control, Low : Index/Status
30	IF MODE1	I	Selection of Data Bus (8Bit or 16bit) . Note 1)
31	GND	-	Ground
32	LED5	I	Cathode of LED5
33	LED4	O	Cathode of LED4
34	LED3	O	Cathode of LED3
35	LED2	O	Cathode of LED2
36	LED1	O	Cathode of LED1
37	LEDA	I	Anode of LED(1,2,3,4,5)
38	Maker ID (H)	O	Maker ID (High)
39	LED_PWM	O	BLU Control Signal
40	GND	-	Ground

Note 1)

Pin No.	Pin Name	8Bit CPU	16Bit CPU
22	IF MODE0	LOW	HIGH
30	IF MODE1	LOW	LOW

Table. Interface between LCD Module and MAIN Board

3.15 Vibrators (Q-Coin Motor)

The strength of vibration is determined by the duty cycle of PWM (LIN_PWM_FREQ)

U601 : EUSY0404001 is Q-Coin motor driver IC.

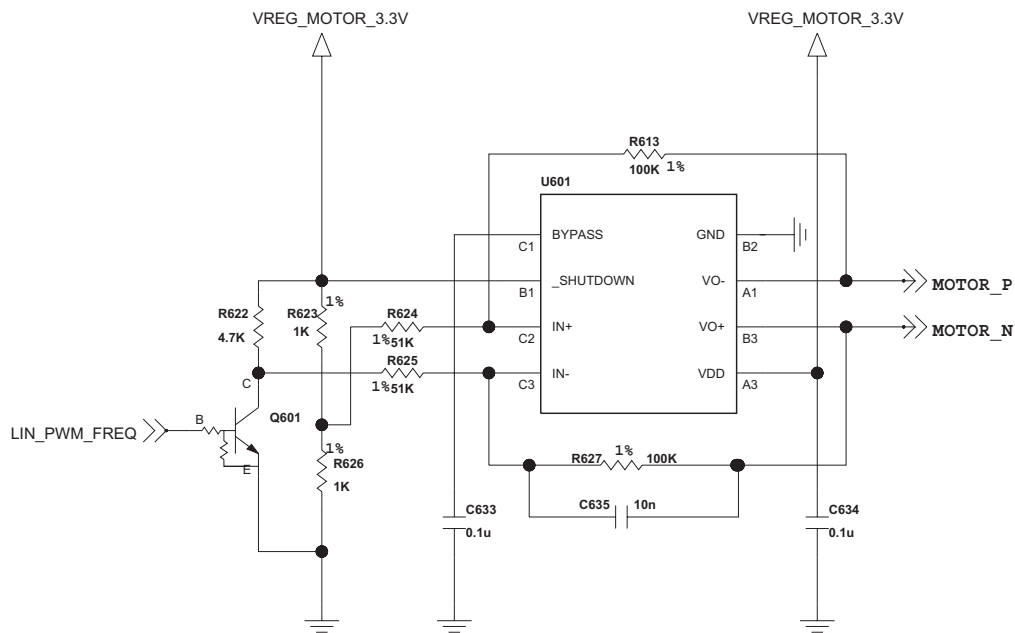


Figure. Q-Coin Motor IC Schematic

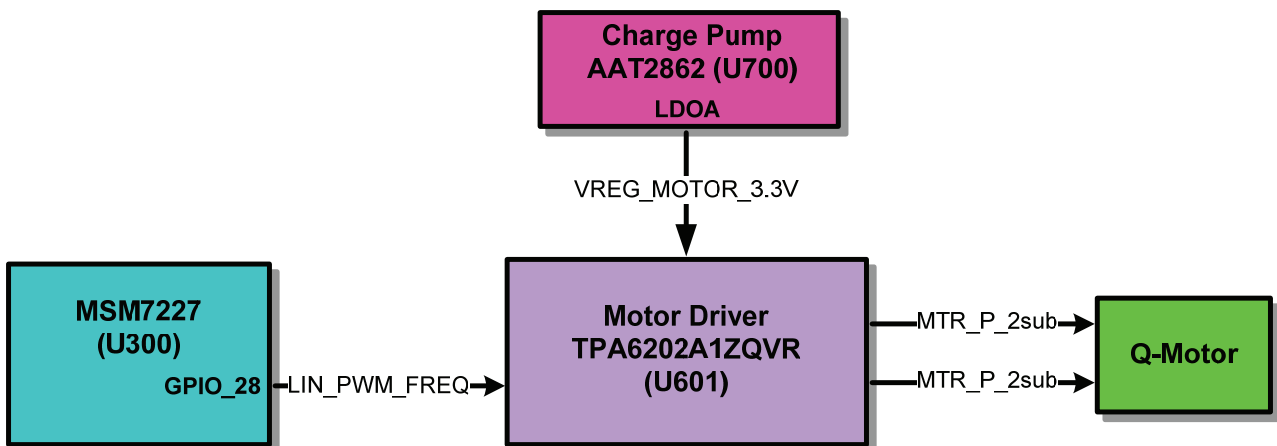


Figure. Vibrator Block Diagram

3.16 Compass Sensor

If a customer buy the application SW, The Sensor Support a Electric Compass function

U604 : AMI304 IC used I2C interface to MSM7227

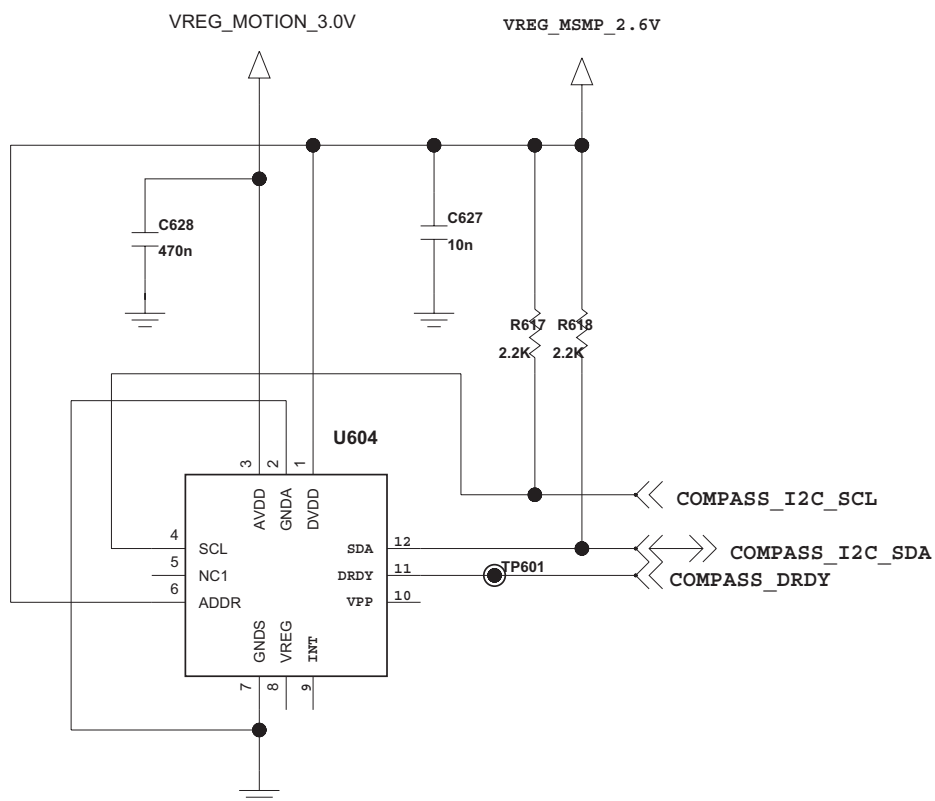


Figure. Compass Sensor Schematic

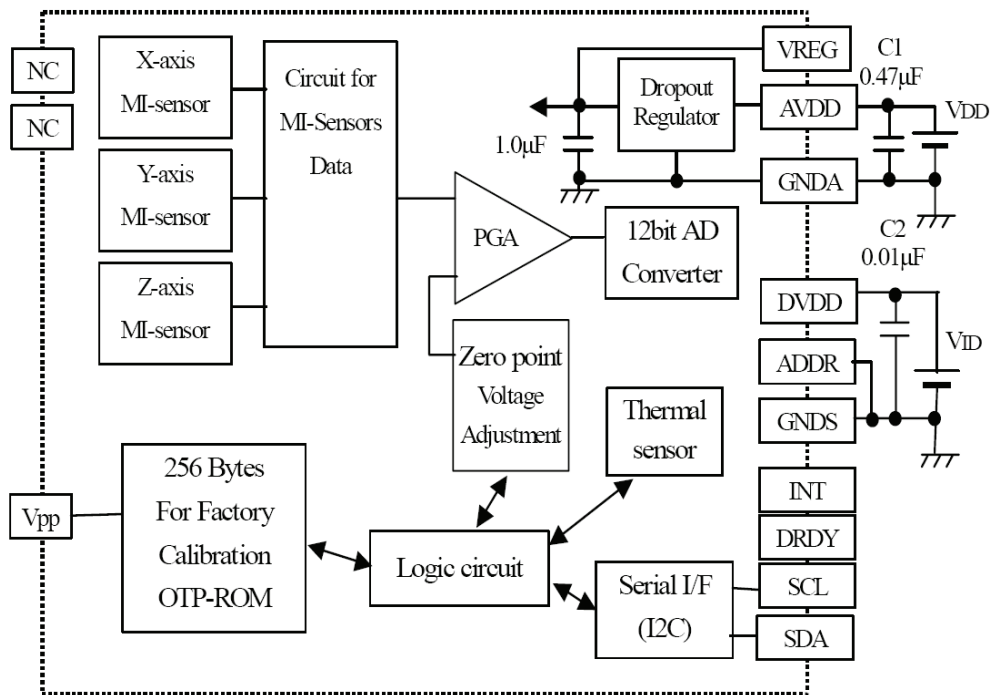


Figure. Compass Sensor Block Diagram

3.17 Motion Sensor

According to tilt the cell phone, the screen is had rotated automatically.

U603 : KR3DH IC used I2C interface to MSM7227

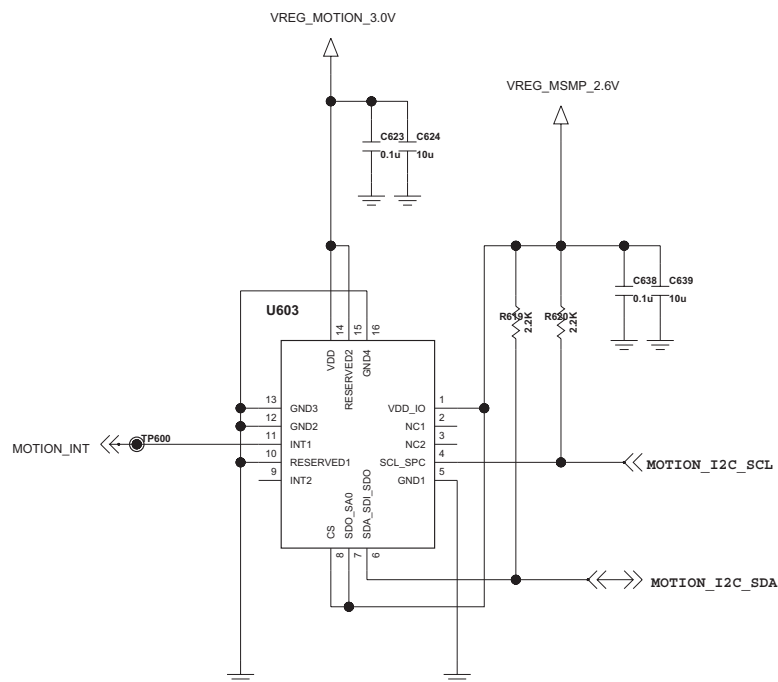


Figure. Motion Sensor Schematic

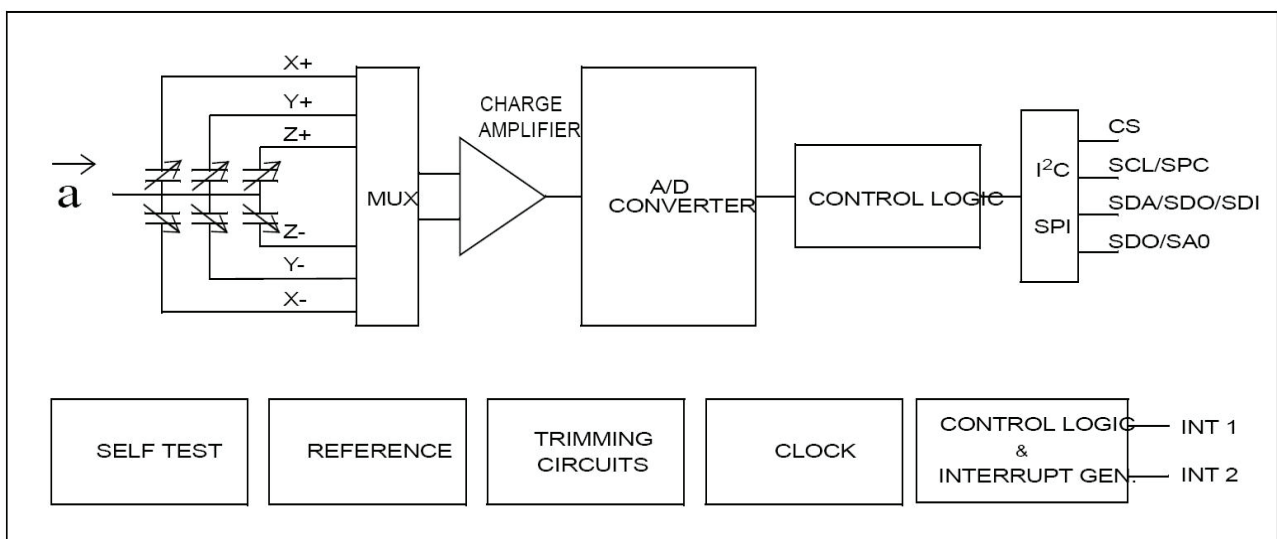


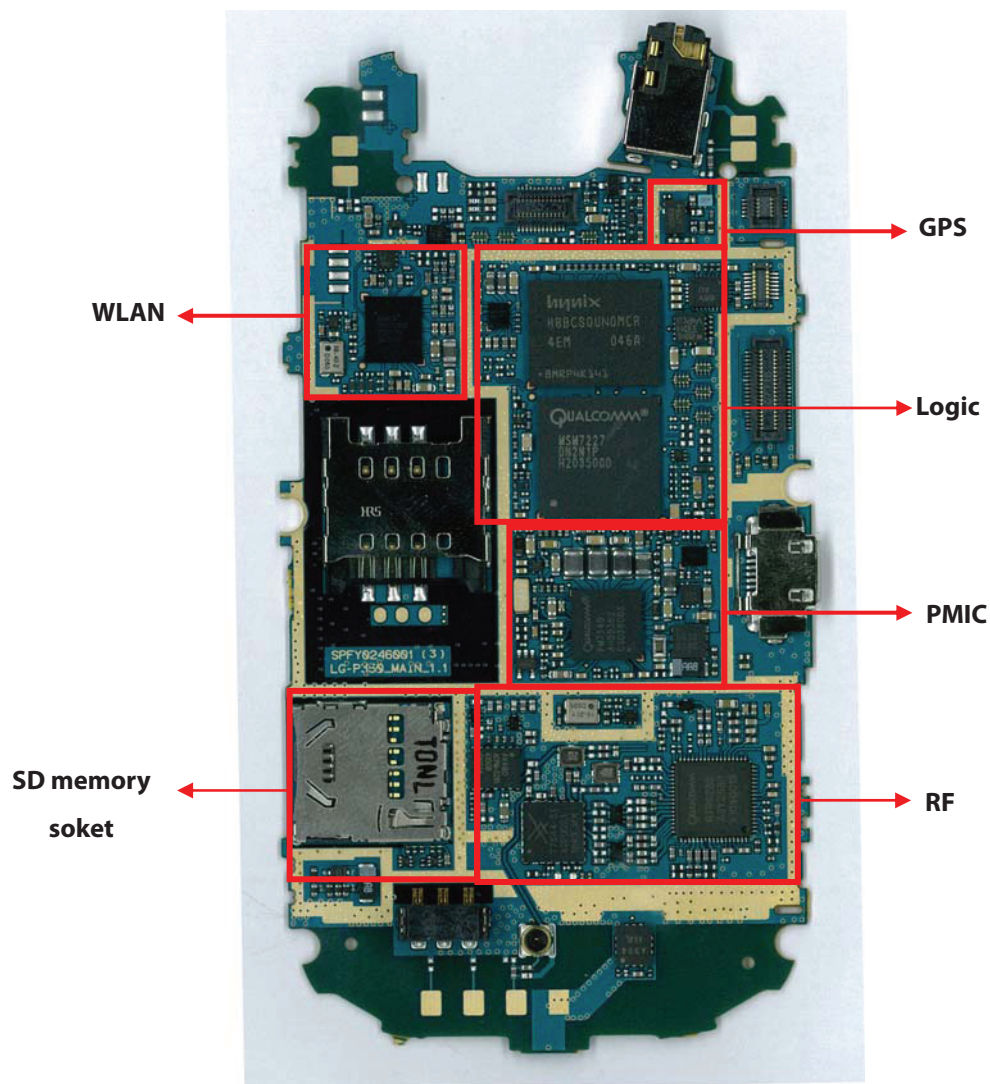
Figure. Motion Sensor Block Diagram

3.18 Main Features

- DOP Type design
- UMTS 2100 + UMTS 900 + GSM 900 + DCS 1800 + PCS 1900 + GSM850 based GSM/GPRS/EDGE/UMTS
- HSDPA 3.6Mbps
- TFT Main LCD(2.8' QVGA, 280 x 320)
- Capacitive/Electrostatic Touch Window
- 3M FF Camera
- 3.5Phi Stereo Headset & Speaker phone
- Mobile XMF –Mobile DLS / Scaleable Polyphony
- MP3/AMR/AAC/AAC/WAV/WMA decoder and play
- MPEG4 encoder/decoder and play/save
- JPEG en/decoder
- Supports Bluetooth and HS-USB
- Supports WLAN(802.11b, 802.11g)
- Supports FM Radio
- 1280 mAh (Li-Ion)

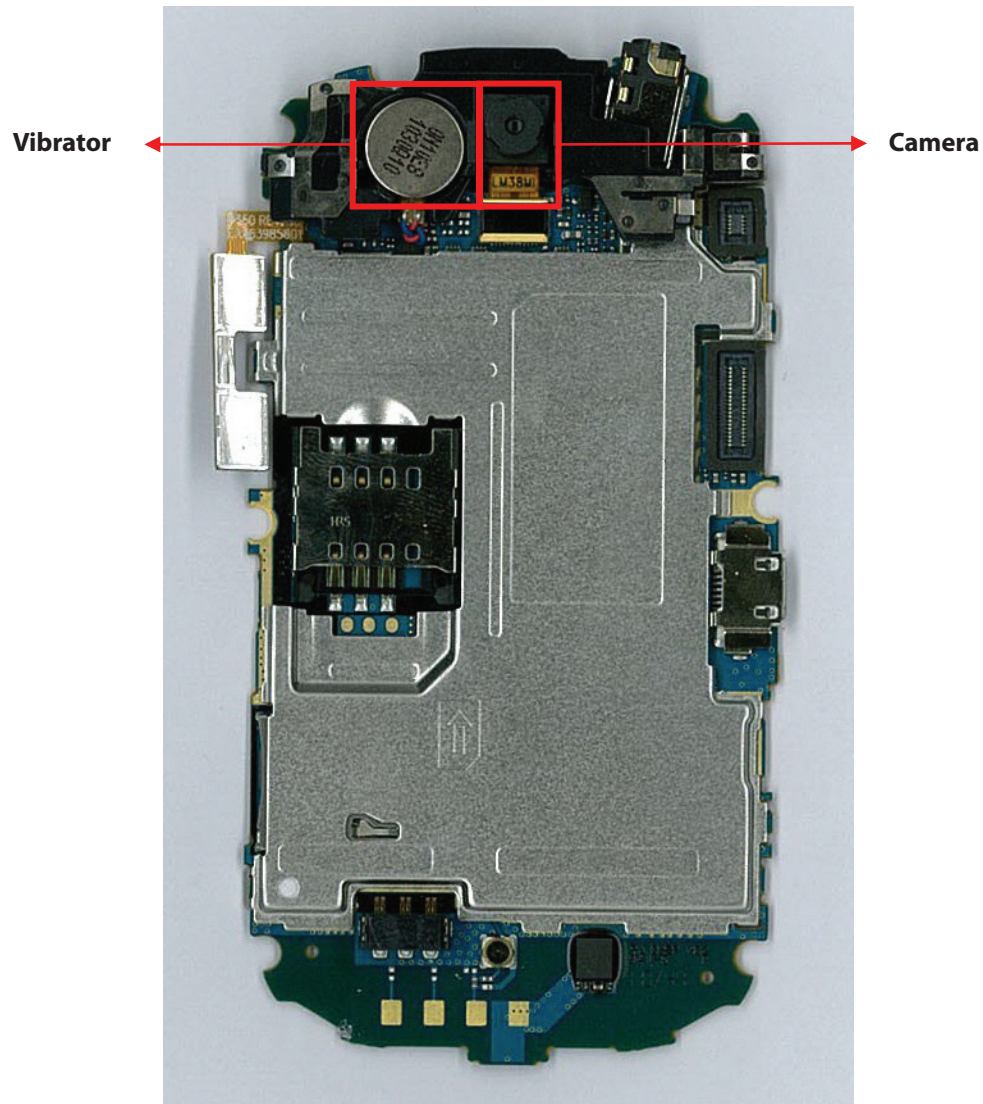
3.19 Main component

3.19.1. LG-P350 Main component (bottom)



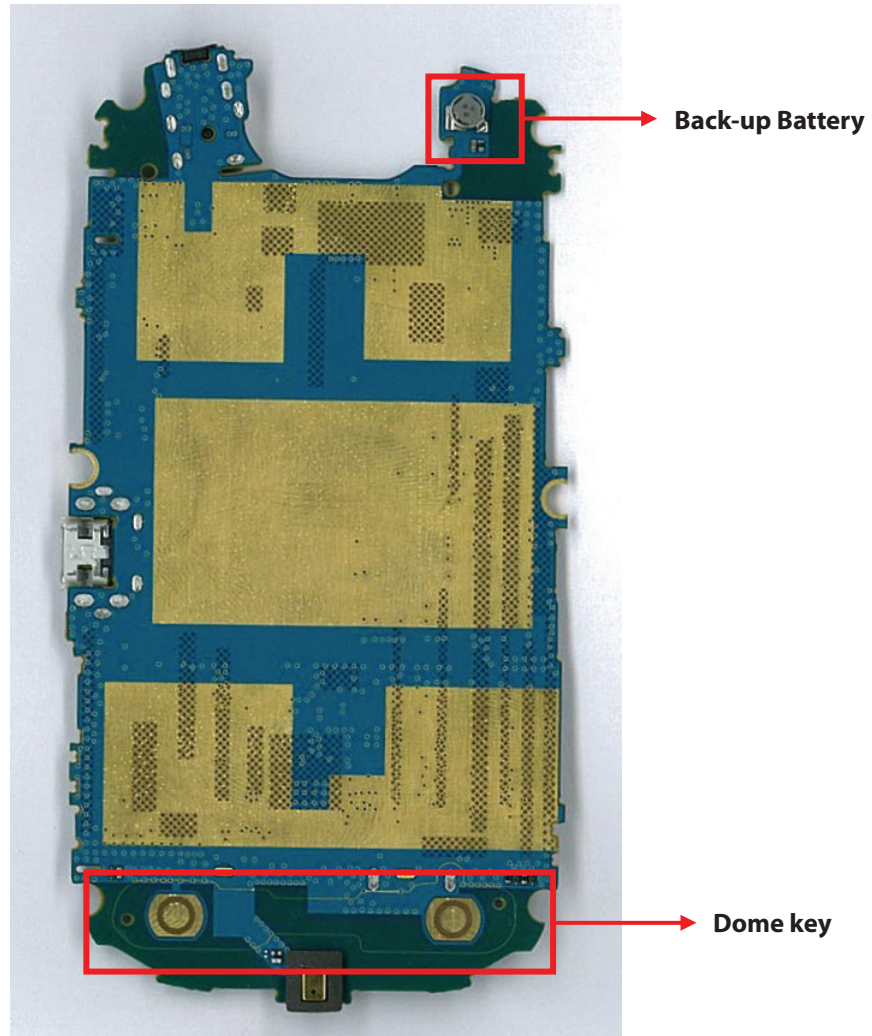
Main Board Bottom

3.19.2. LG-P350 Main component (bottom & Sub carrier)



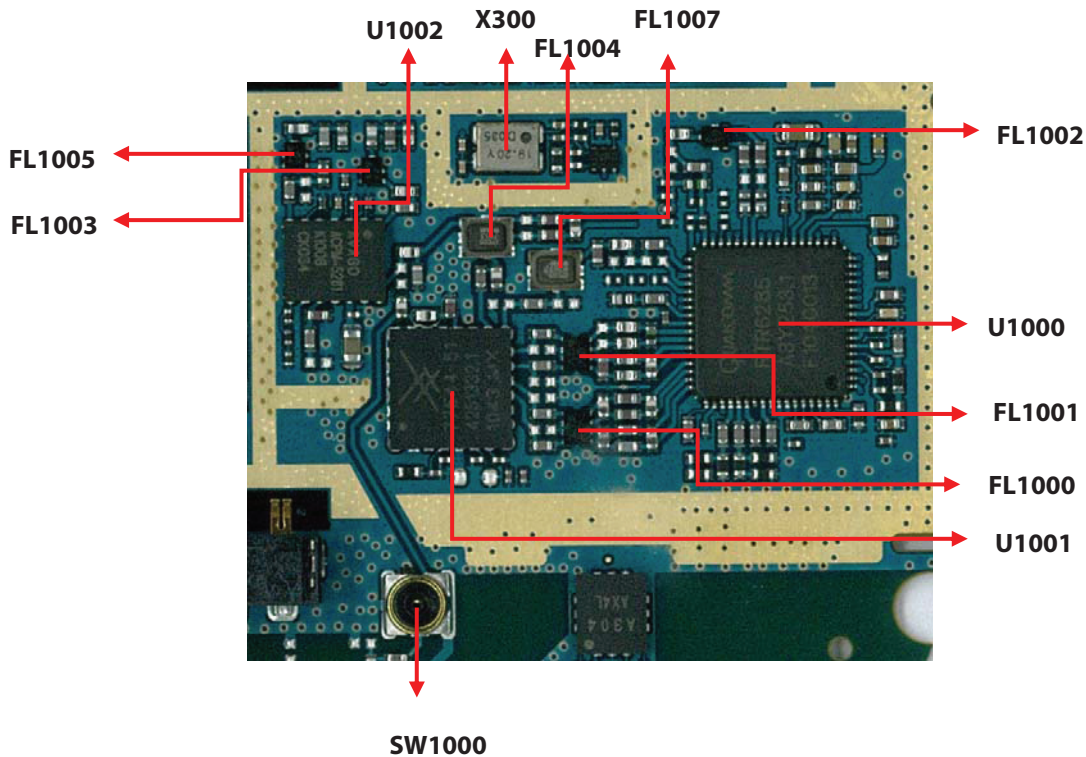
Main Board Bottom & Sub carrier

3.19.3. LG-P350 Main component (Top)



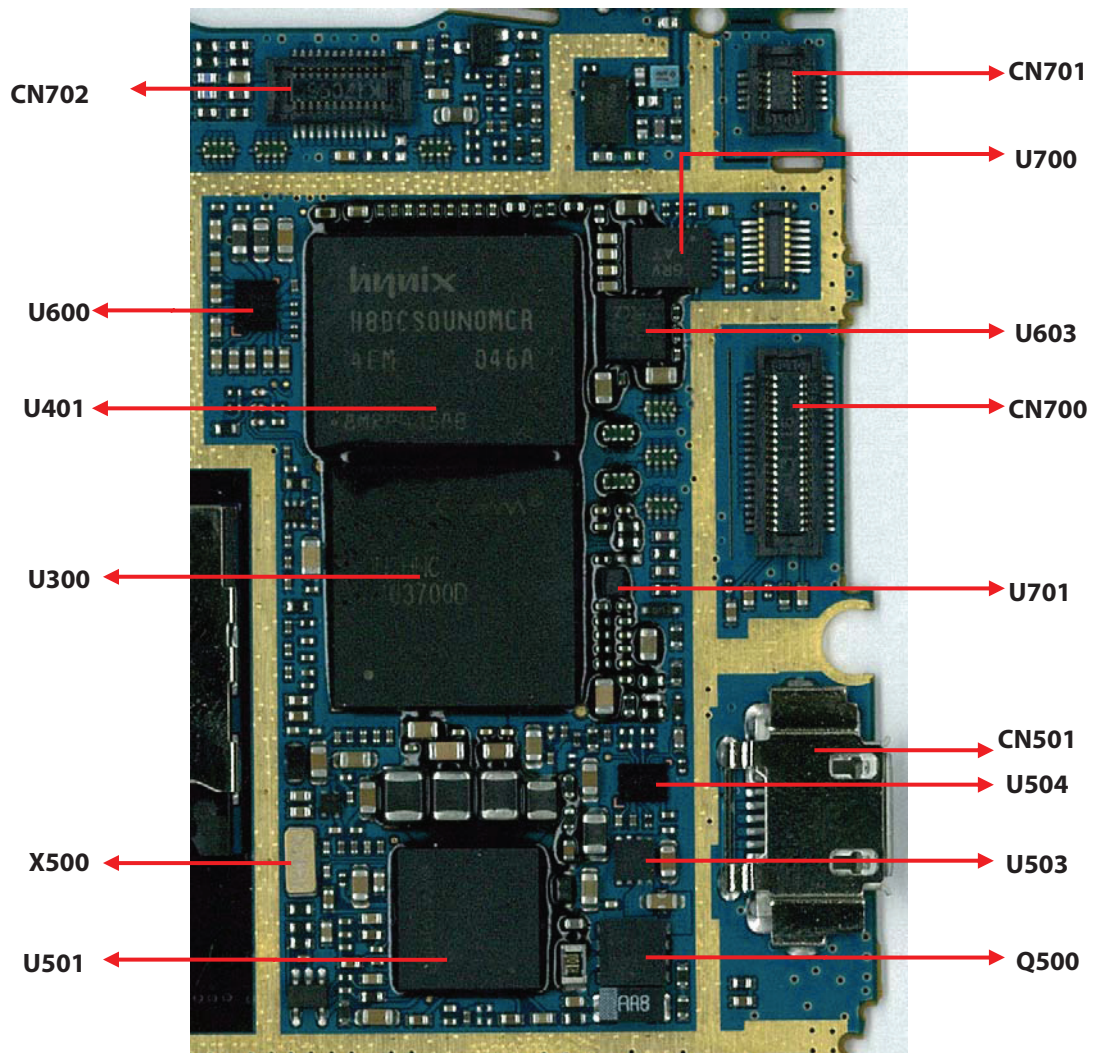
Main Board Top

3.19.4. RF of LG-P350



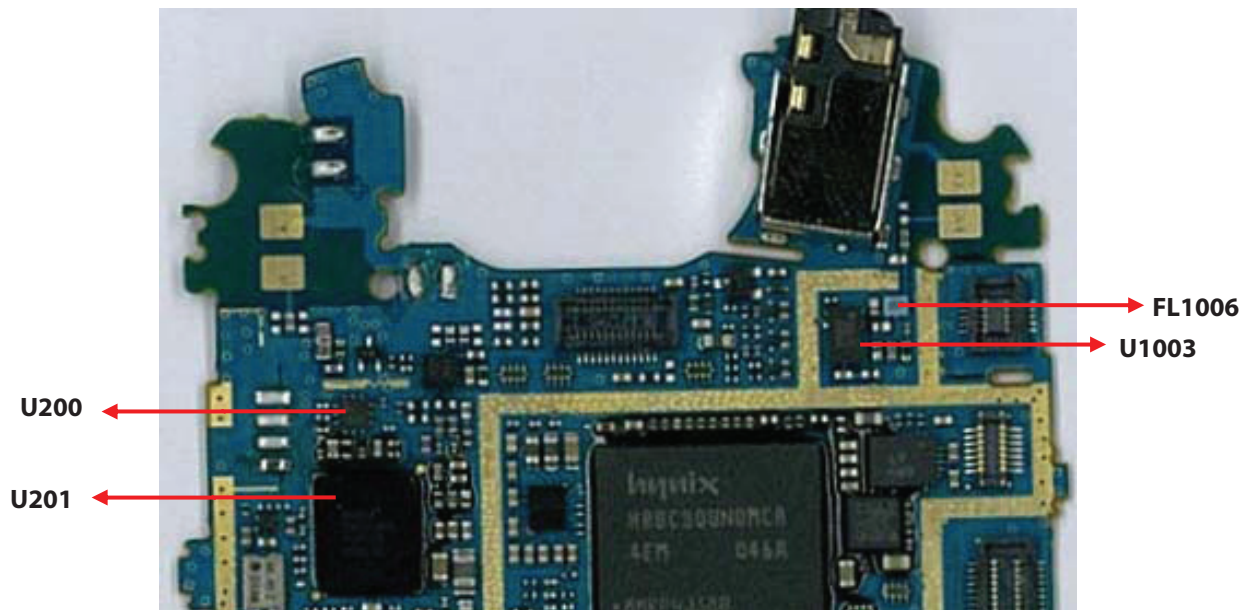
Reference	Description	Reference	Description
U1000	RTR6285(Transceiver)	FL1000	EGSM/850 Rx saw filter
U1001	GSM TX Module (ASM + GSM/EDGE PAM)	FL1001	DCS/PCS Rx saw filter
U1002	WCDMA Dual (I,VIII) PAM	X300	VCTCXO(19.2MHz)
FL1005	WCDMA (I) TX SAW Filter	SW1000	RF Antenna Connector
FL1003	WCDMA (VIII) TX SAW Filter	FL1002	WCDMA (I) RX SAW Filter
FL1007	WCDMA (I) Duplexer	FL1004	WCDMA (VIII) Duplexer

3.19.5. BaseBand AND Power of LG-P350



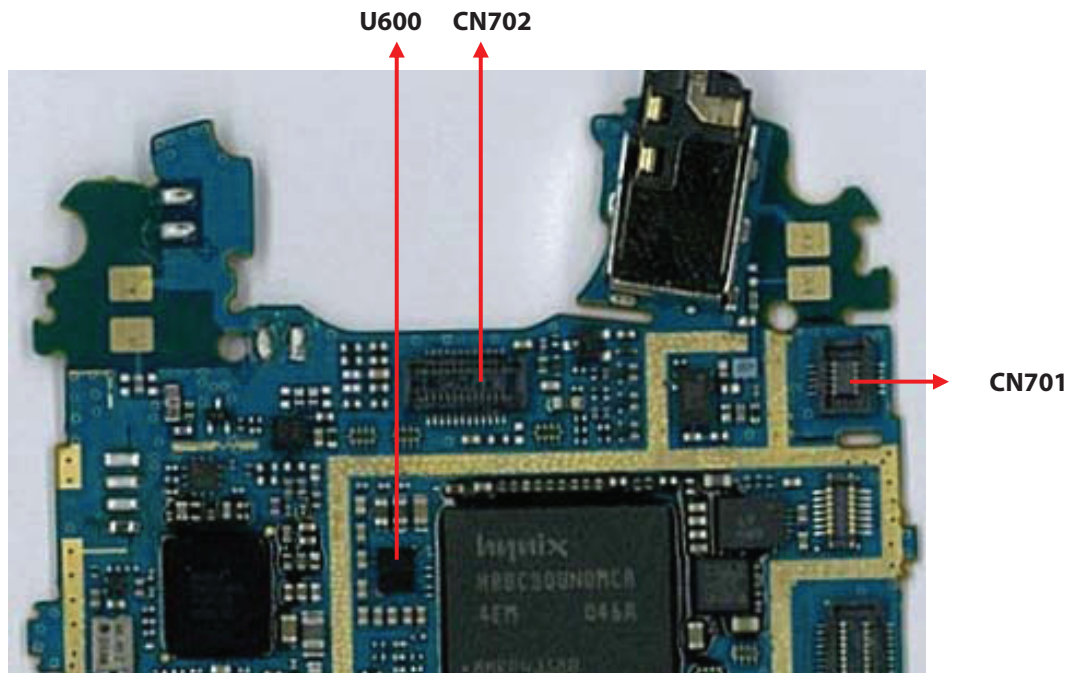
Reference	Description	Reference	Description
CN702	Camera Connector	U603	Motion Sensor
U600	Audio Sub System	CN700	LCD Connector
U401	Memory	U701	Level shifter
U300	MSM7227	CN501	I/O Connector
X500	Crystal	U504	MUIC
U501	PMIC	U503	OVP IC
CN701	Touch Connector	Q500	Charging IC
U700	Charge Pump IC		

3.19.6. GPS WIFI of LG-P350



Reference	Description	Reference	Description
U201	WiFi(11bg)+BT+FM(Rx) Chip	U1003	GPS LNA
U200	SP3T+LNA	FL1006	SAW Filter

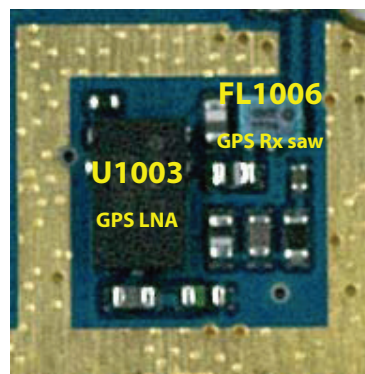
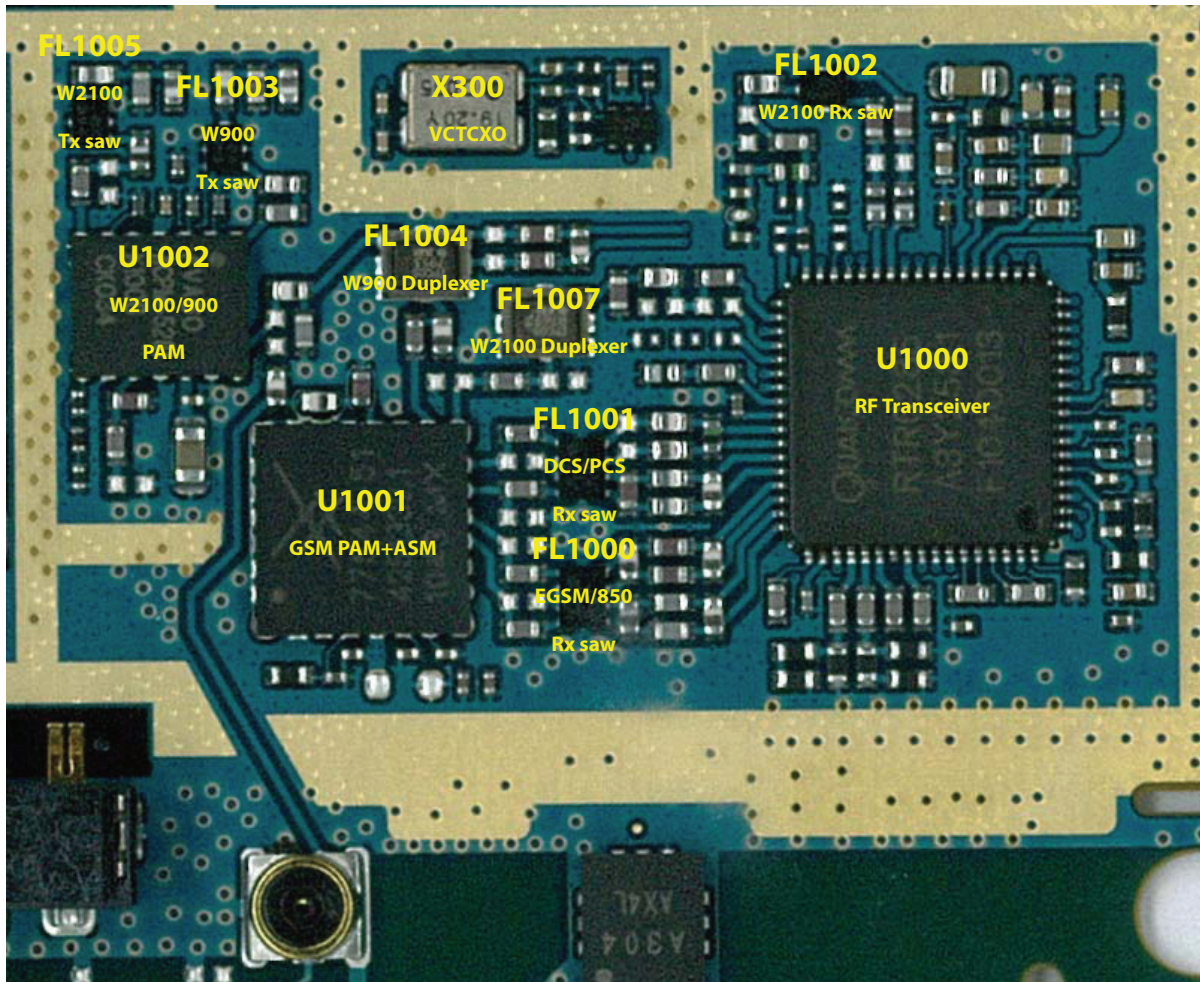
3.19.7. Audio of LG-P350



Reference	Description	Reference	Description
U600	TPA2055D3	CN701	Touch Connector
CN702	Camera Connector		

4. TROUBLE SHOOTING

4.1 RF Component

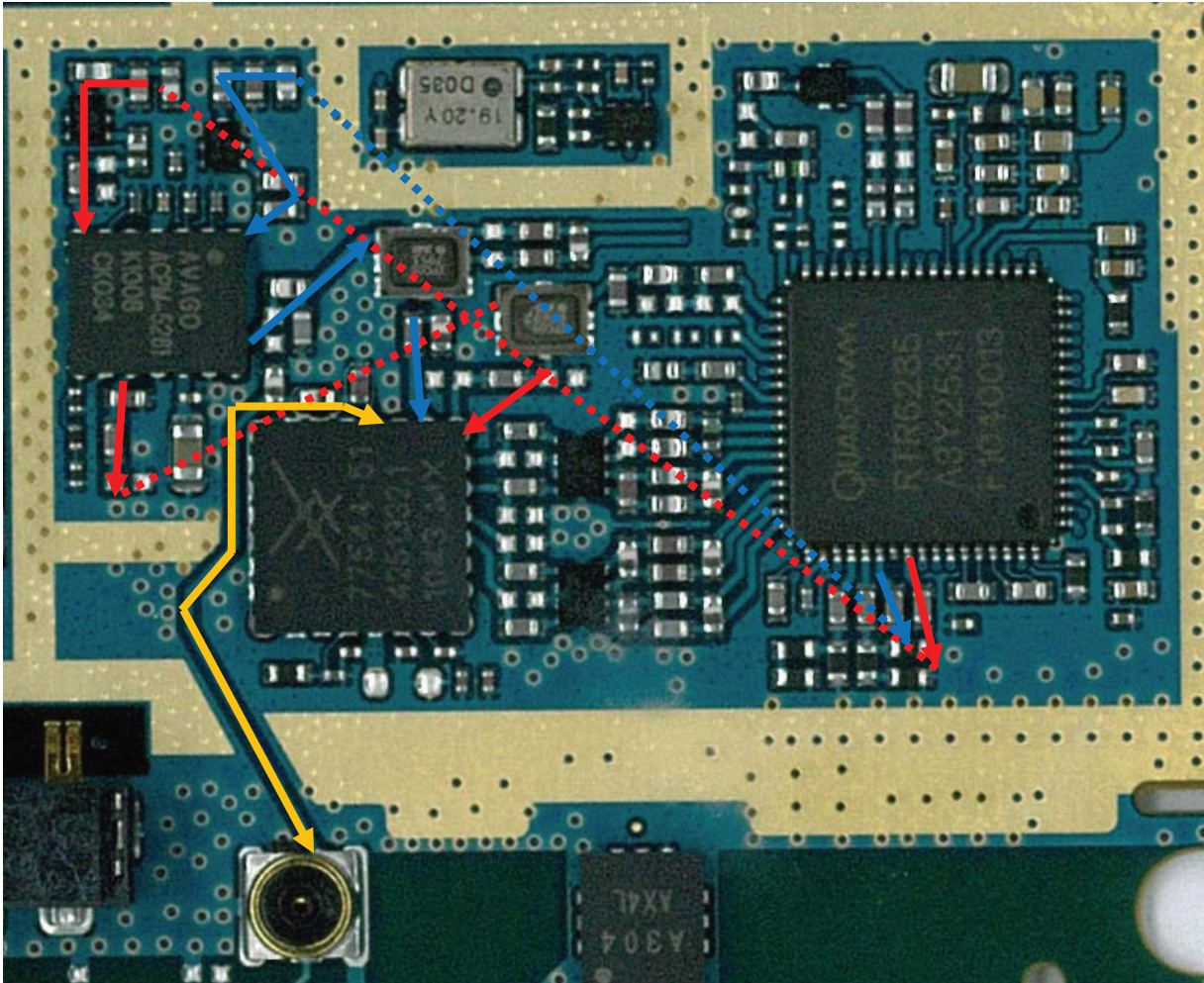


4. TROUBLE SHOOTING

RF component (WCDMA / GSM)

Reference	Description	Reference	Description
U1000	RTR6285(Transceiver)	FL1002	WCDMA (I) RX SAW Filter
U1001	GSM TX Module (ASM + GSM/EDGE PAM)	FL1000	EGSM/850 Rx saw filter
U1002	WCDMA Dual (I,VIII) PAM	FL1001	DCS/PCS Rx saw filter
FL1005	WCDMA (I) TX SAW Filter	X300	VCTCXO(19.2MHz)
FL1003	WCDMA (VIII) TX SAW Filter	U1003	GPS LNA
FL1007	WCDMA (I) Duplexer	FL1006	GPS RX SAW Filter
FL1004	WCDMA (VIII) Duplexer	SW1000	RF Antenna Connector

4.2 SIGNAL PATH

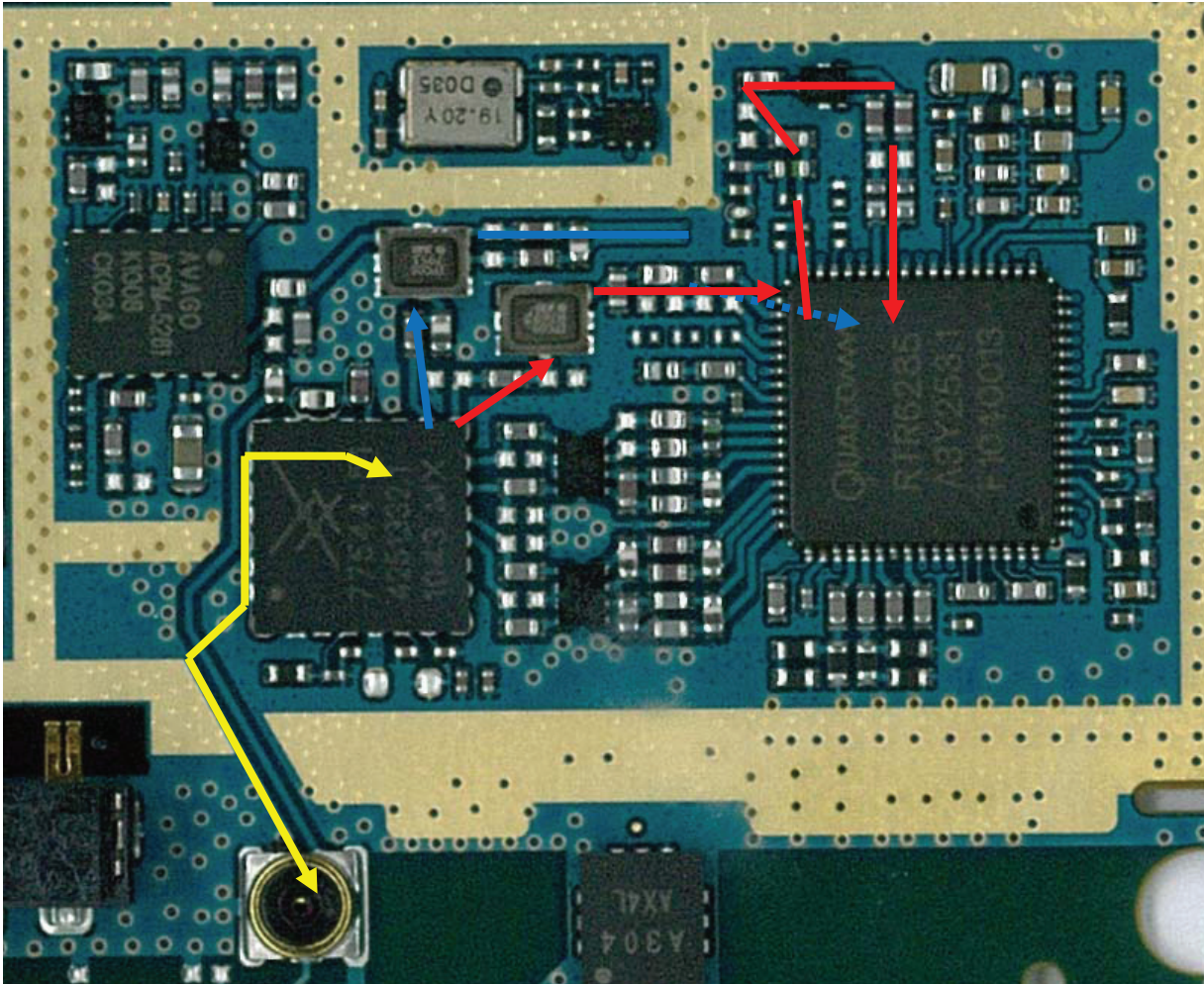


WCDMA I and VIII Band TX Signal PATH

D2. WCDMA 2100 TX PATH

E2. WCDMA 900 TX PATH

F1. COMMON TX/RX PATH



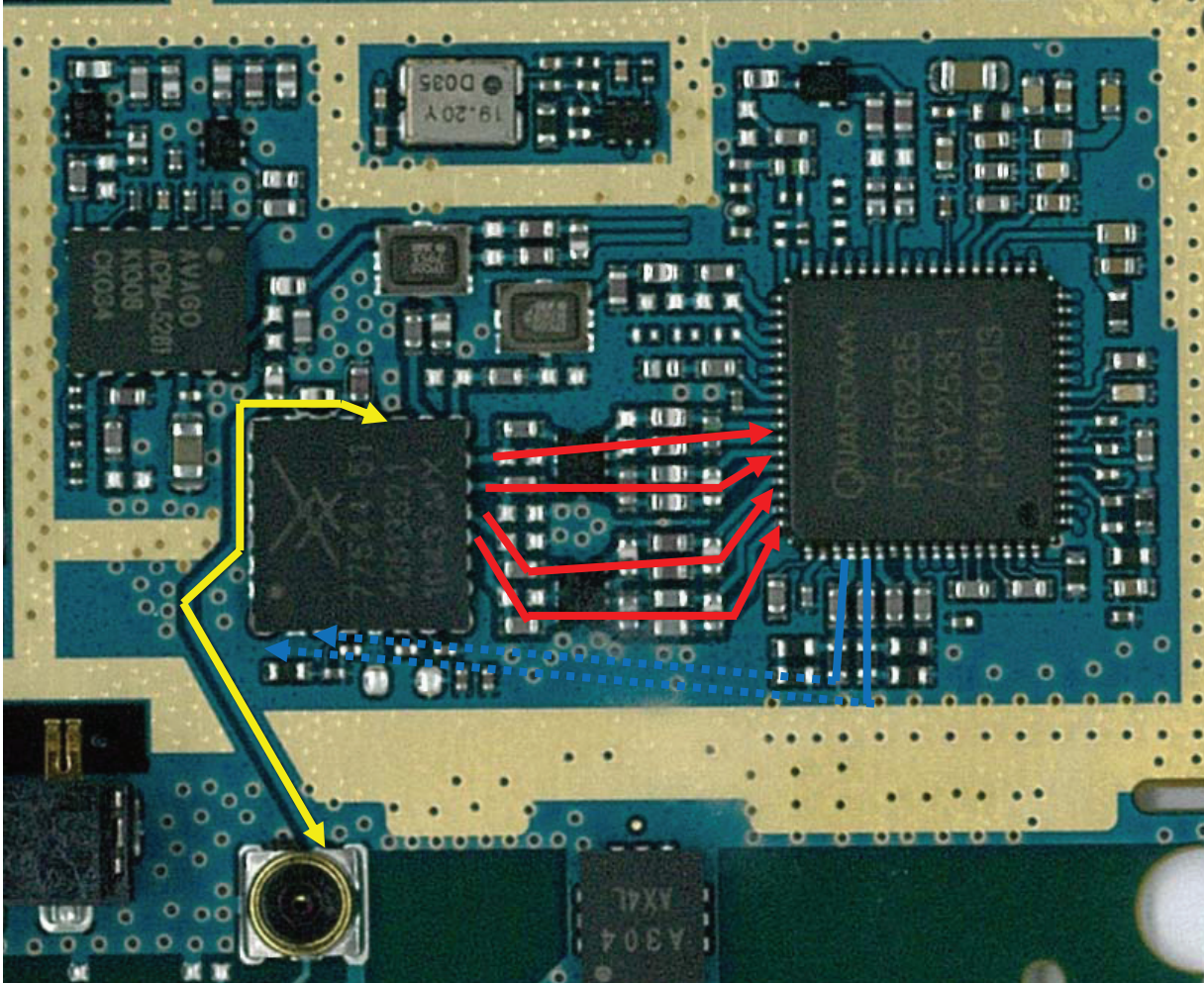
WCDMA BAND I and VIII RX Signal PATH

D1. WCDMA 2100 RX PATH

E1. WCDMA 900 RX PATH

F1. COMMON TX/RX PATH

4. TROUBLE SHOOTING



GSM850/GSM900/DCS/PCS's RX/TX Signal PATH

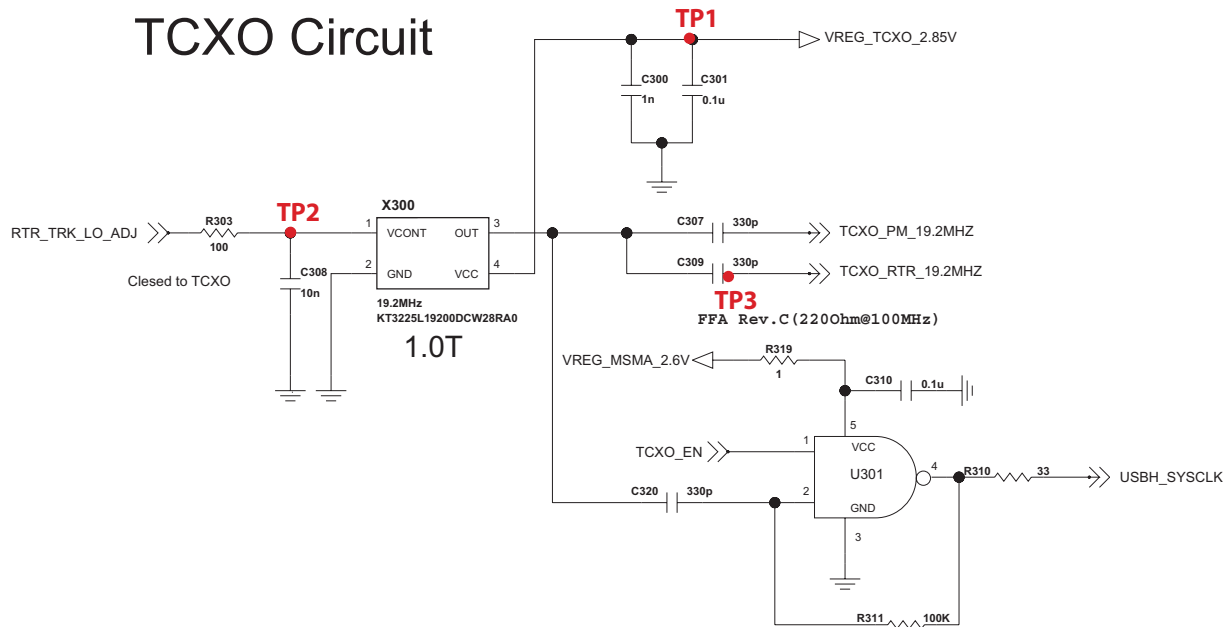
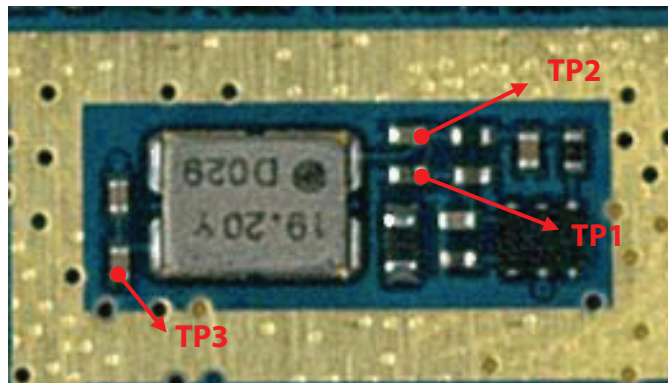
A. GSM850/GSM900/DCS1800/PCS1900 RX PATH

B. GSM850/GSM900/DCS1800/PCS1900 TX PATH

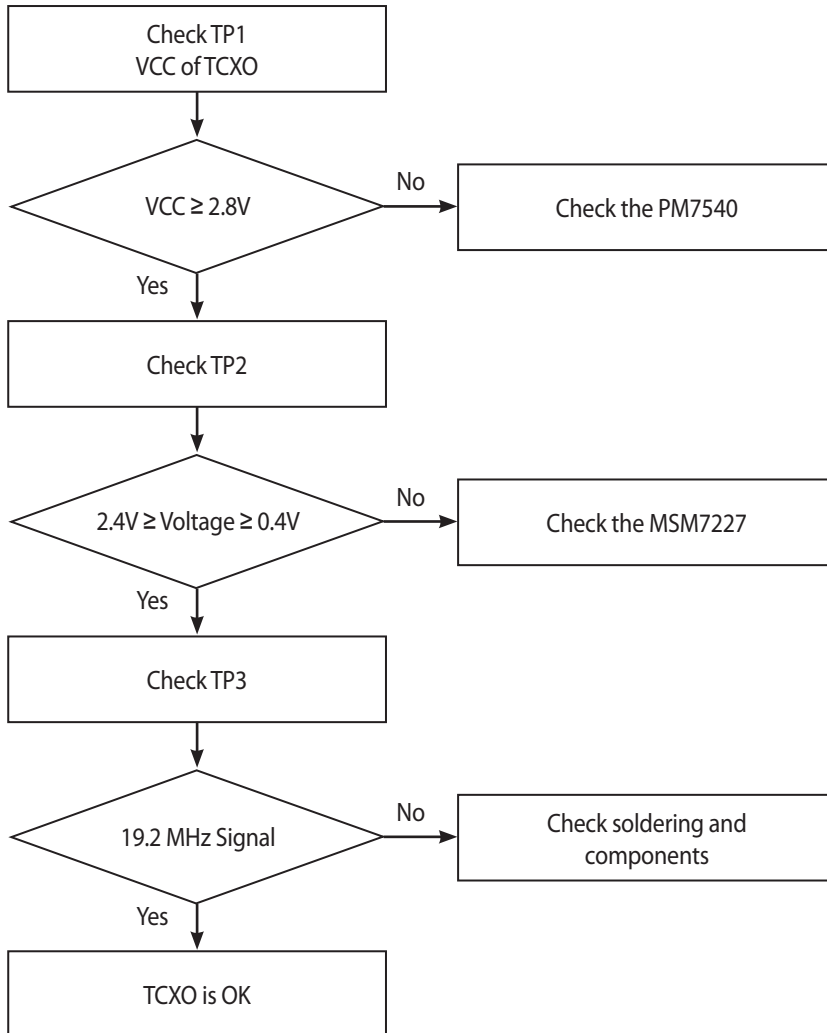
C. COMMON TX/RX PATH

4.3 Checking TCXO Block

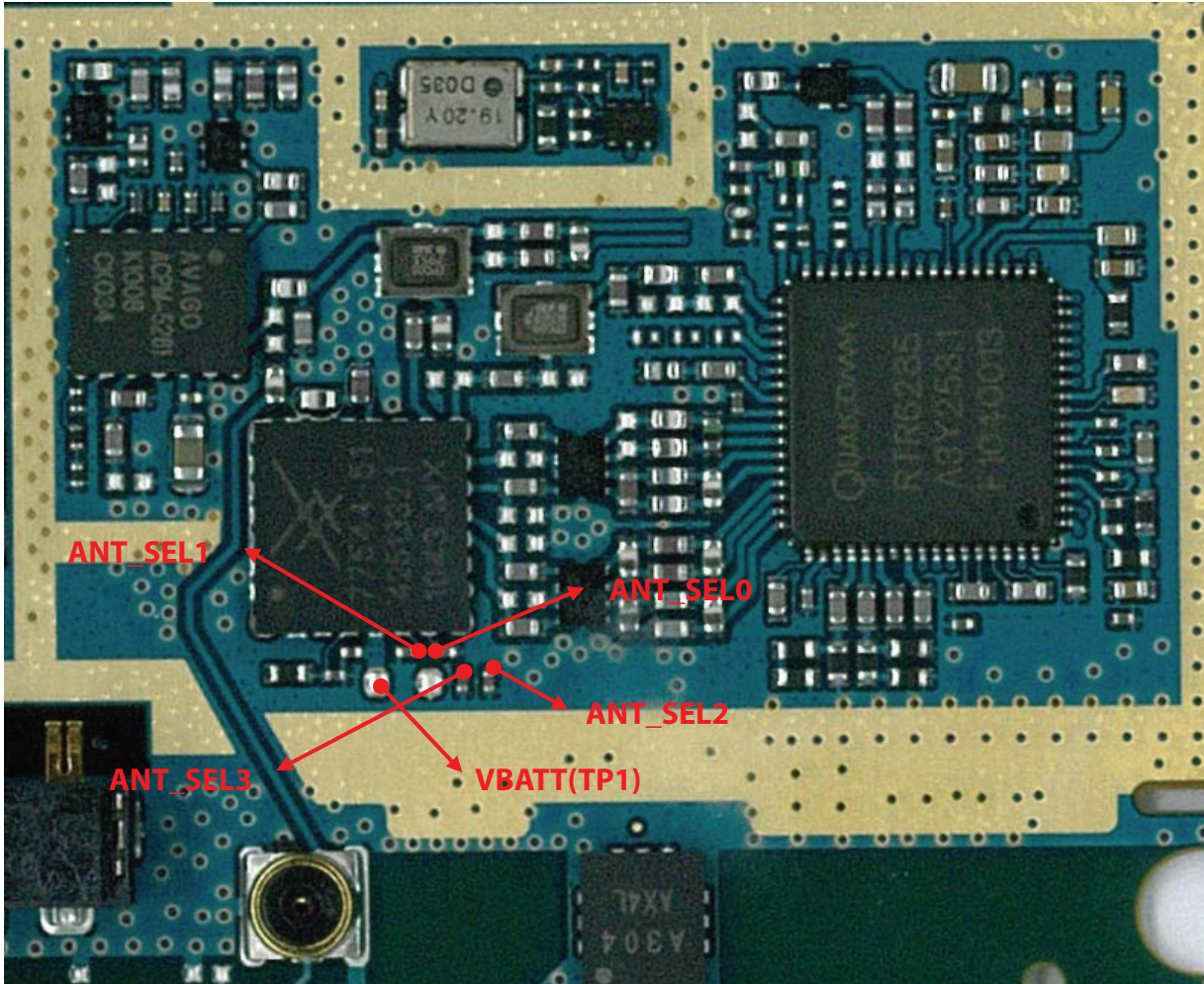
The output frequency (19.2MHz) of TCXO (X200) is used as the reference one of RTR6285 and PM7540 internal VCO.



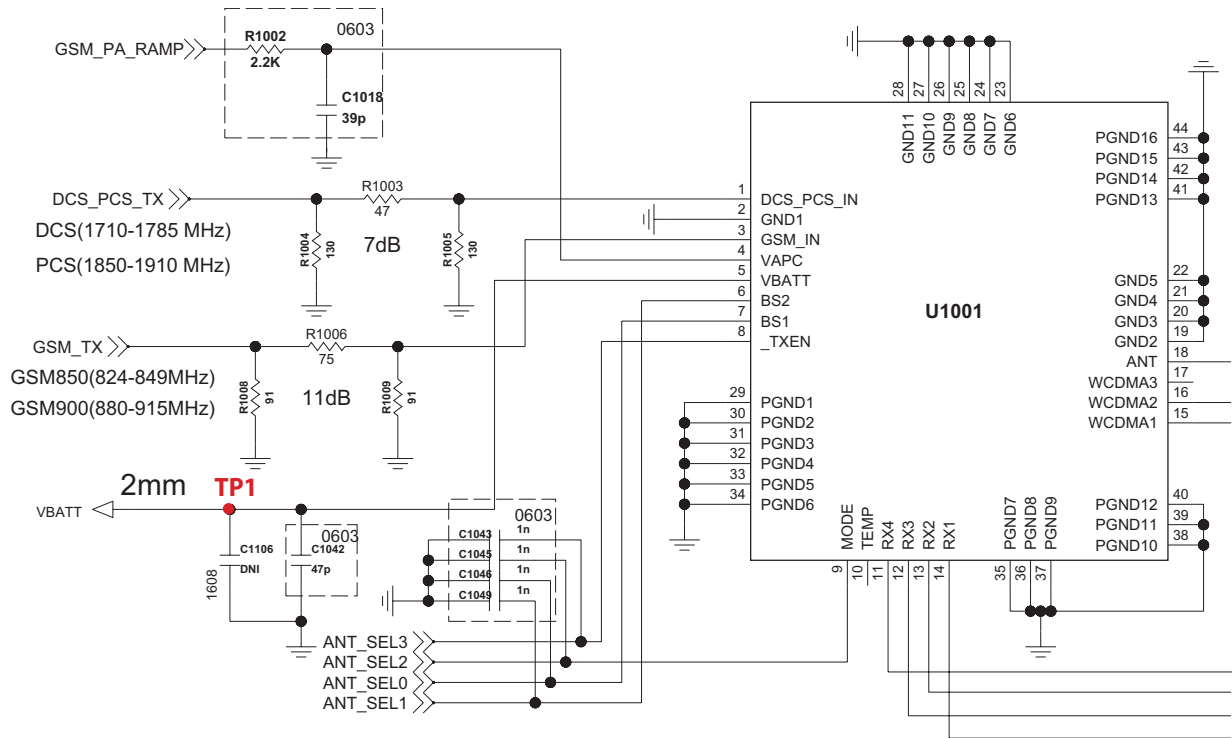
Schematic of the Crystal Part (19.2MHz)



4.4 Checking GSM TX Module(GSM PAM + ASM) Block



4. TROUBLE SHOOTING

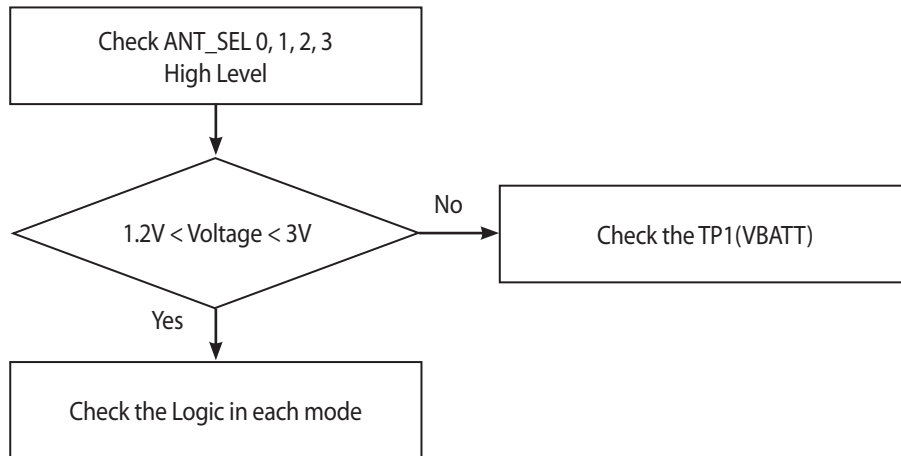


Schematic of the Antenna Switch Block

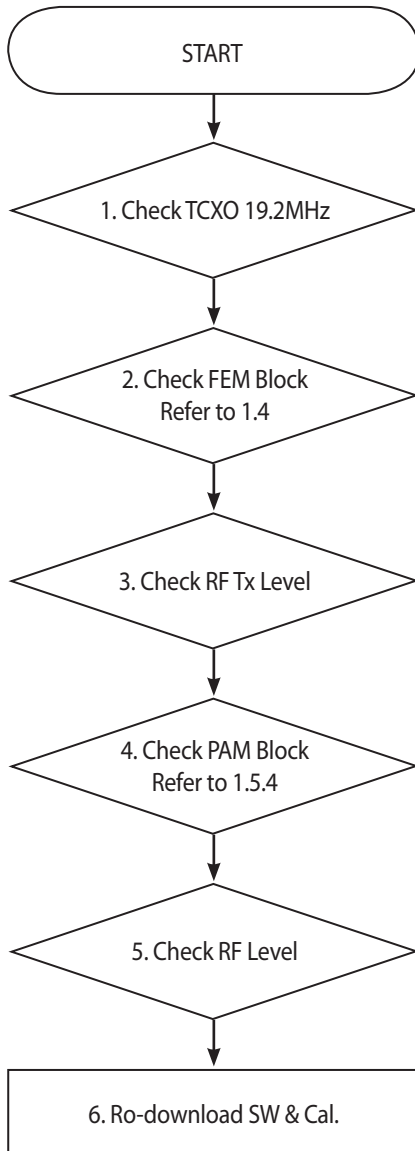
ANTENNA SWITCH MODULE LOGIC(SKY77544)

	ANT_SEL0	ANT_SEL1	ANT_SEL2	ANT_SEL3
GSM850/GSM900 TX	LOW	HIGH	LOW	LOW
DCS1800/PCS1900 TX	HIGH	HIGH	LOW	LOW
PCS1900 RX	LOW	LOW	LOW (X)	HIGH
DCS1800 RX	LOW	HIGH	LOW (X)	HIGH
GSM900 RX	HIGH	HIGH	LOW (X)	HIGH
GSM850 RX	HIGH	LOW	LOW (X)	HIGH
W2100	HIGH	LOW	LOW	LOW
W900(W850)	LOW	LOW	HIGH	LOW
W1700	HIGH	LOW	HIGH	LOW

Checking Switch Block Power Source



4.5 Checking WCDMA Block



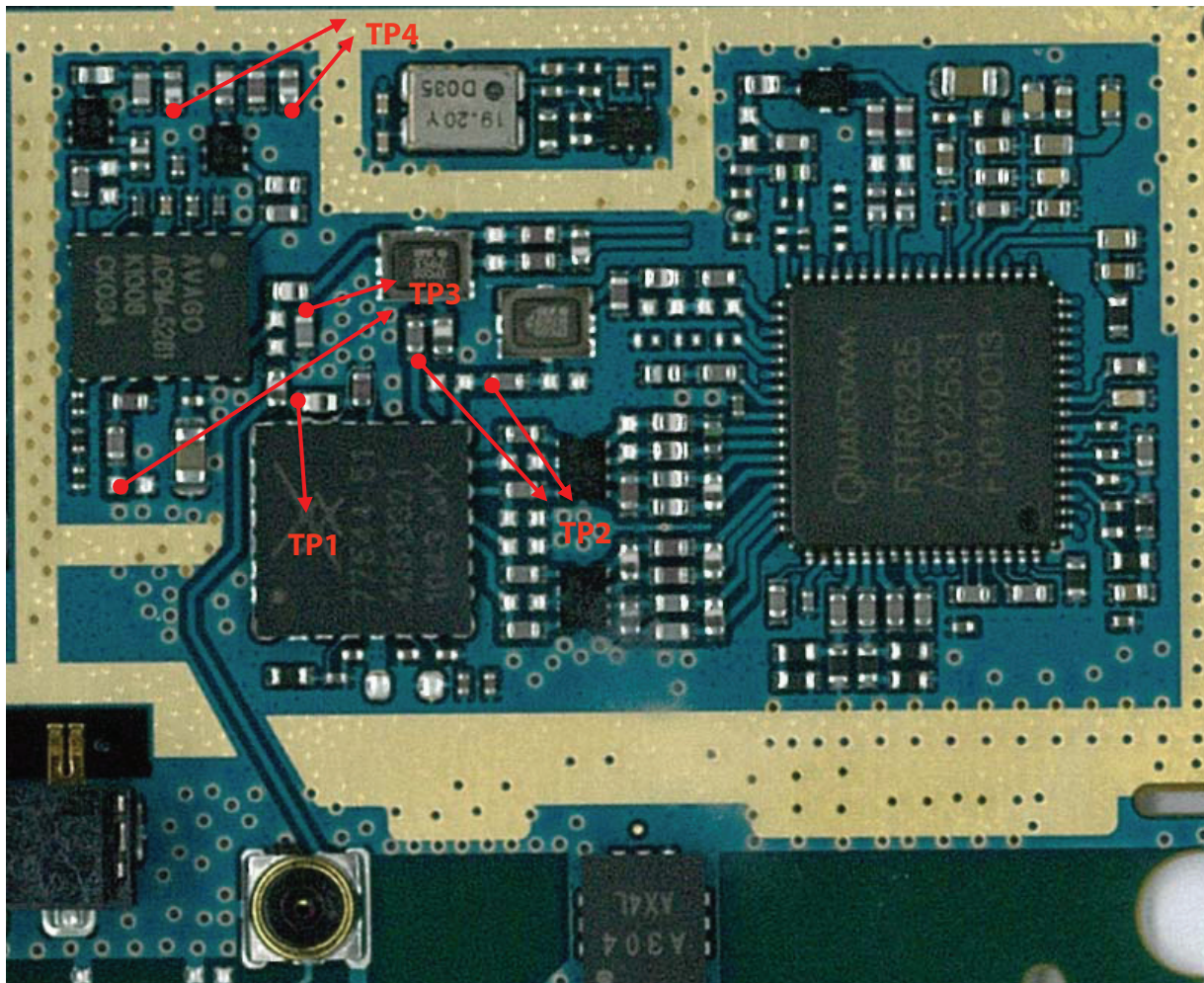
4.5.1 Checking TCXO Block

Refer to 1.3

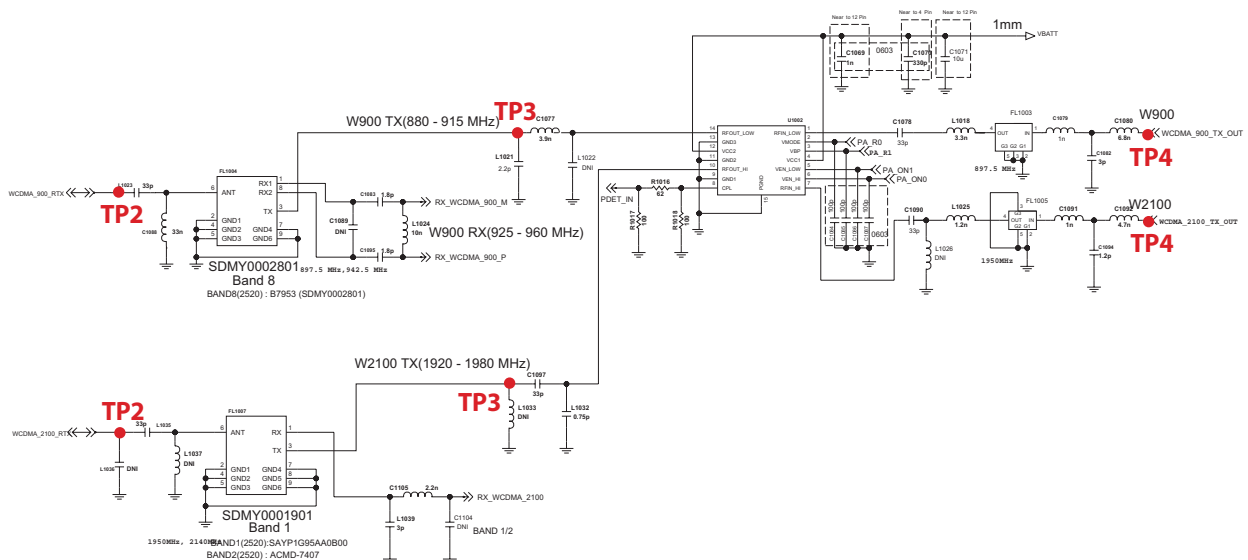
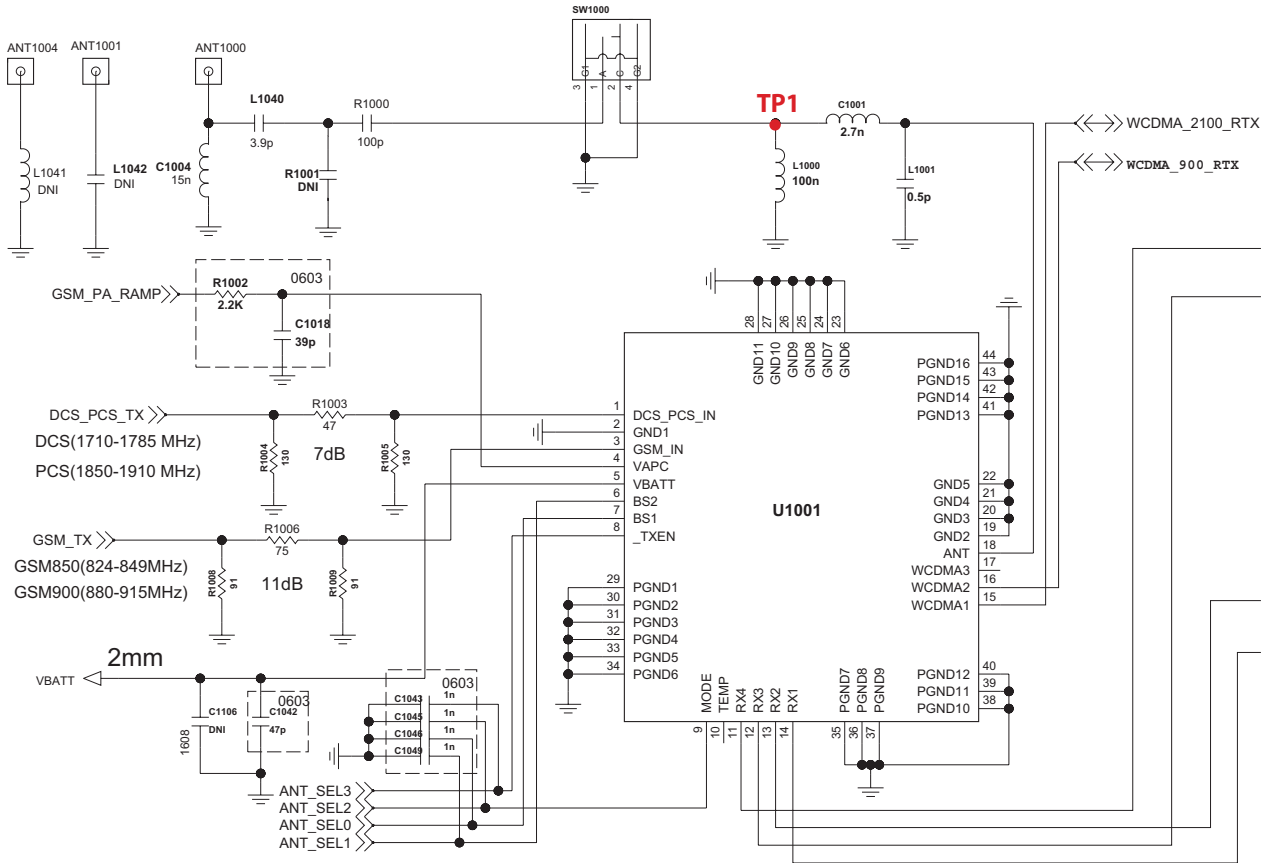
4.5.2. Checking Tx Module Block

Refer to 1.4

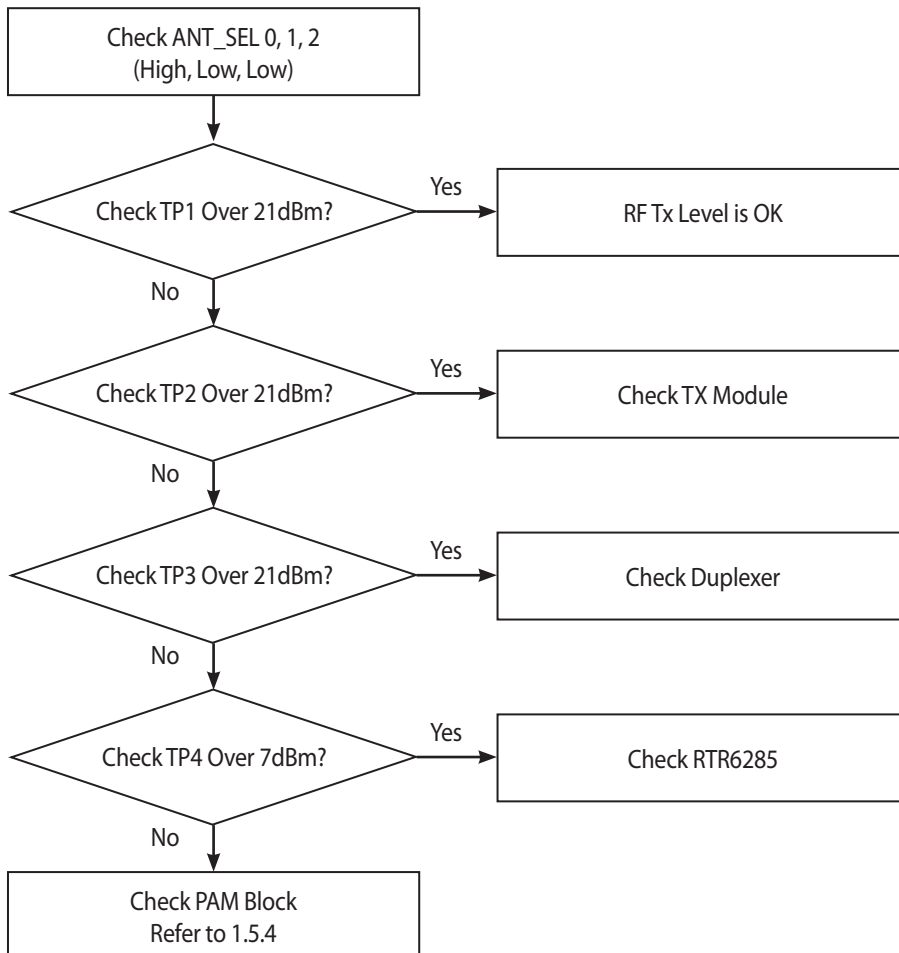
4.5.3. Checking RF TX Level



Test Point (TX Level)



For testing, Max power output is needed.



RTR6285 Maximum output Power = 7 dBm
RTR6285 minimum output Power = -80 dBm
PAM(ACPM-5281) = Maximum input Power = 10 dBm

4.5.4. Checking PAM Block

PAM control signal

W_PA_ON (W_1700_PA_ON(C1115), W_2100_PA_ON(C1095) and) : PAM Enable

W_PA_RO: PAM Gain Control

W_PA_ON must be HIGH (over 2.6V)

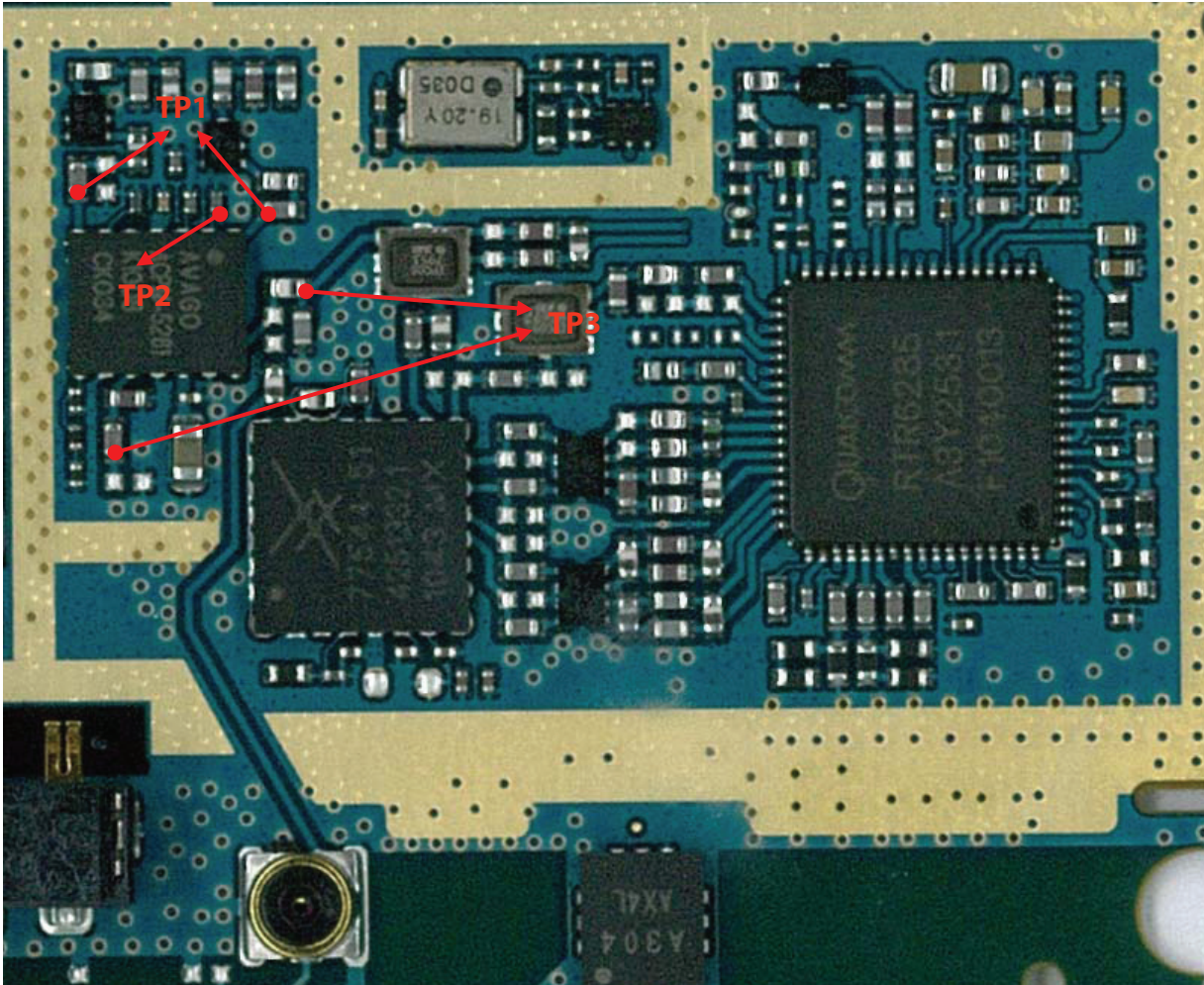
PAM IN/OUT Signal :

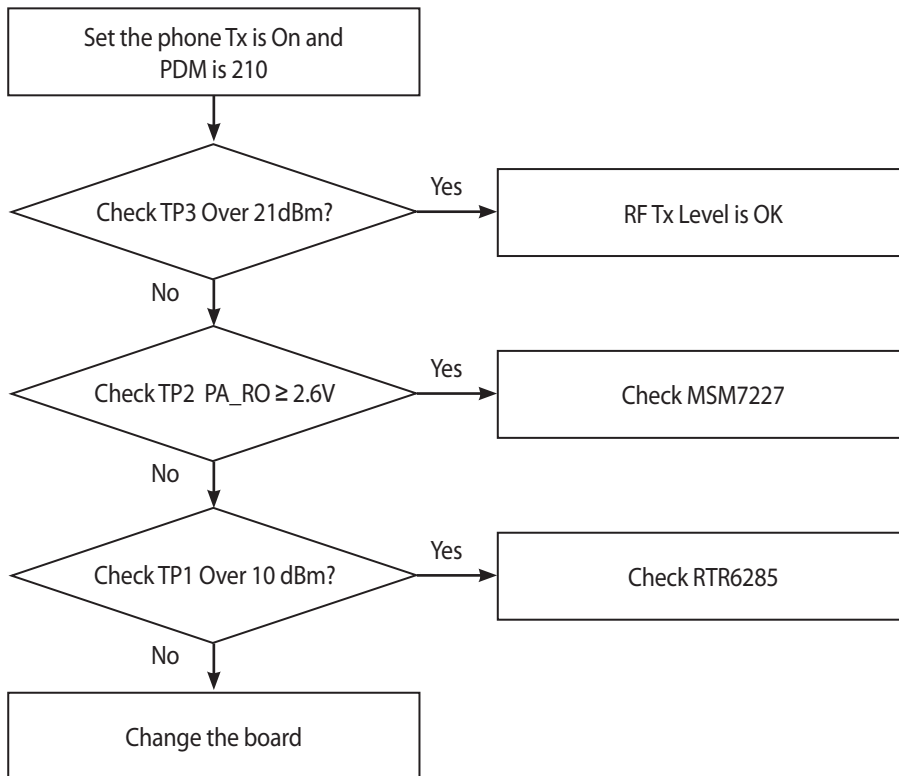
When PAM is under the operation of high power mode (WCDMA_PA_R0(C1929):Low),

PAM OUT power must be over 21 dBm

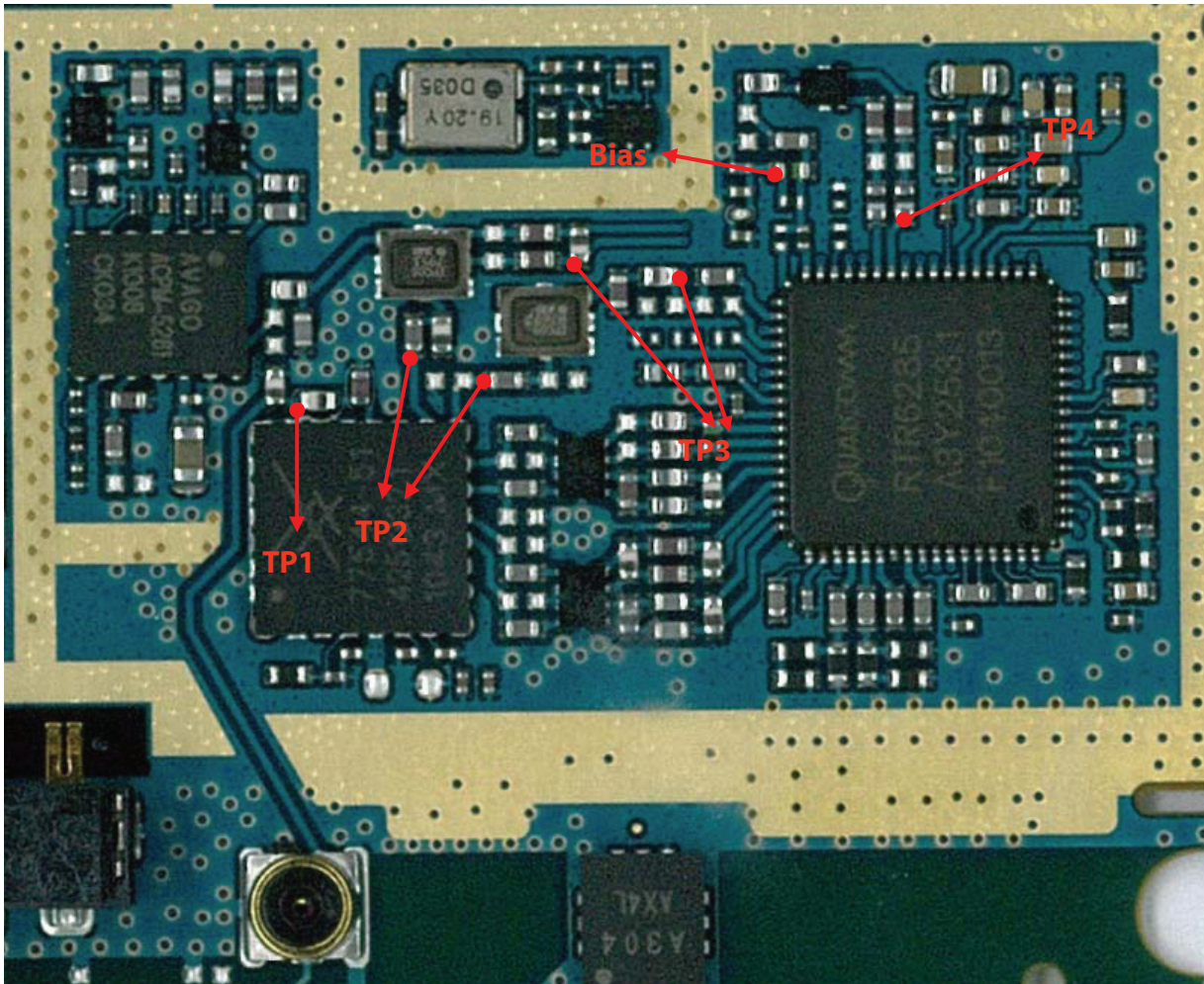
PAM IN power must be under 10 dBm

4. TROUBLE SHOOTING



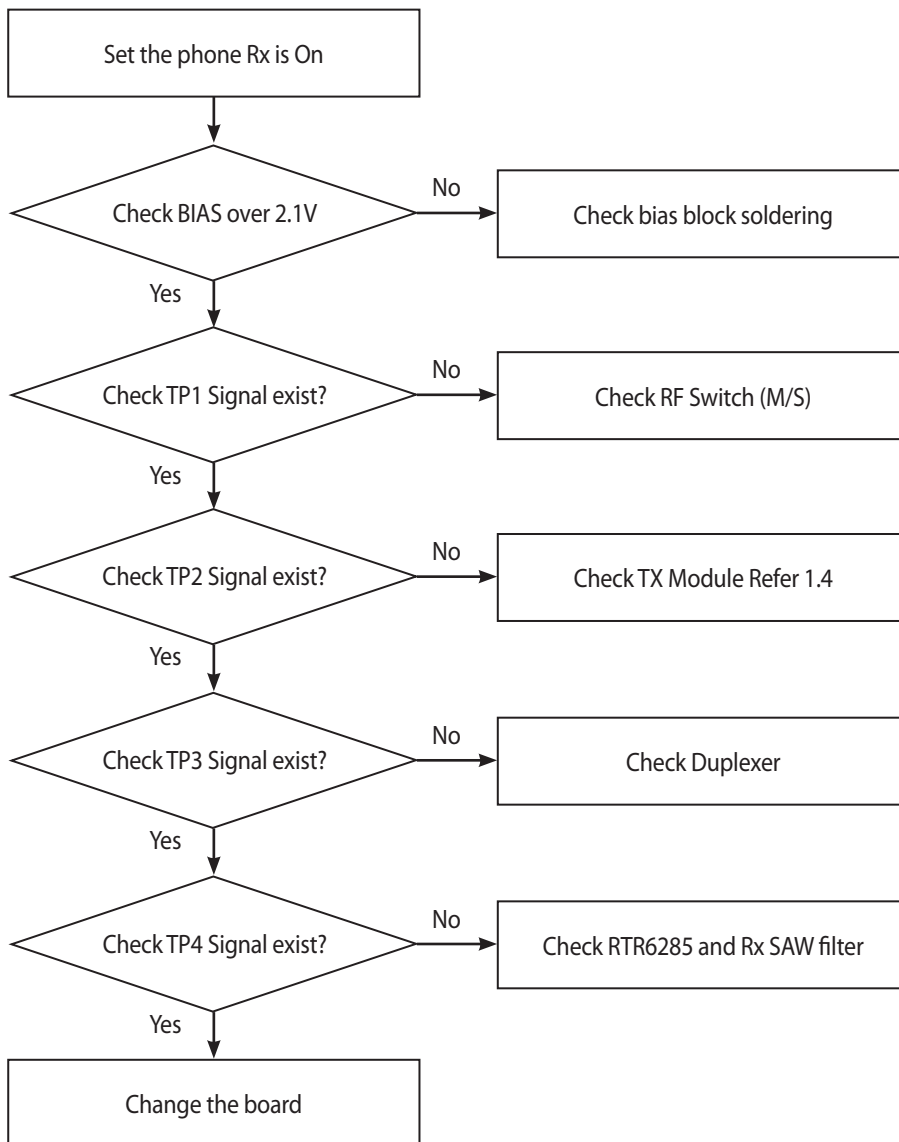
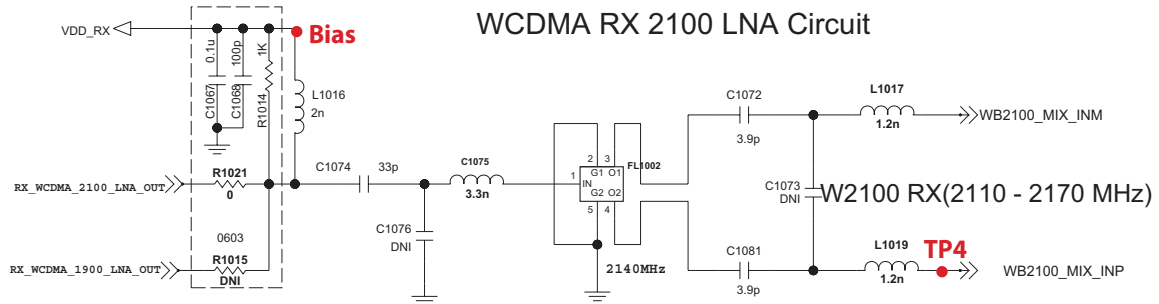


4.5.5. Checking RF Rx Level

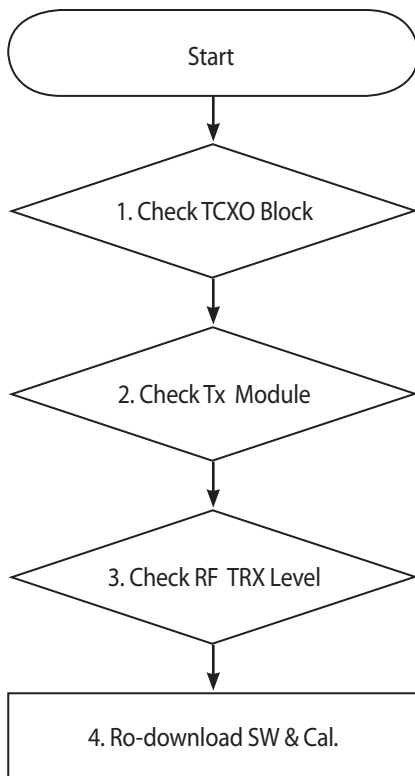


Test Point (RF Rx Level)

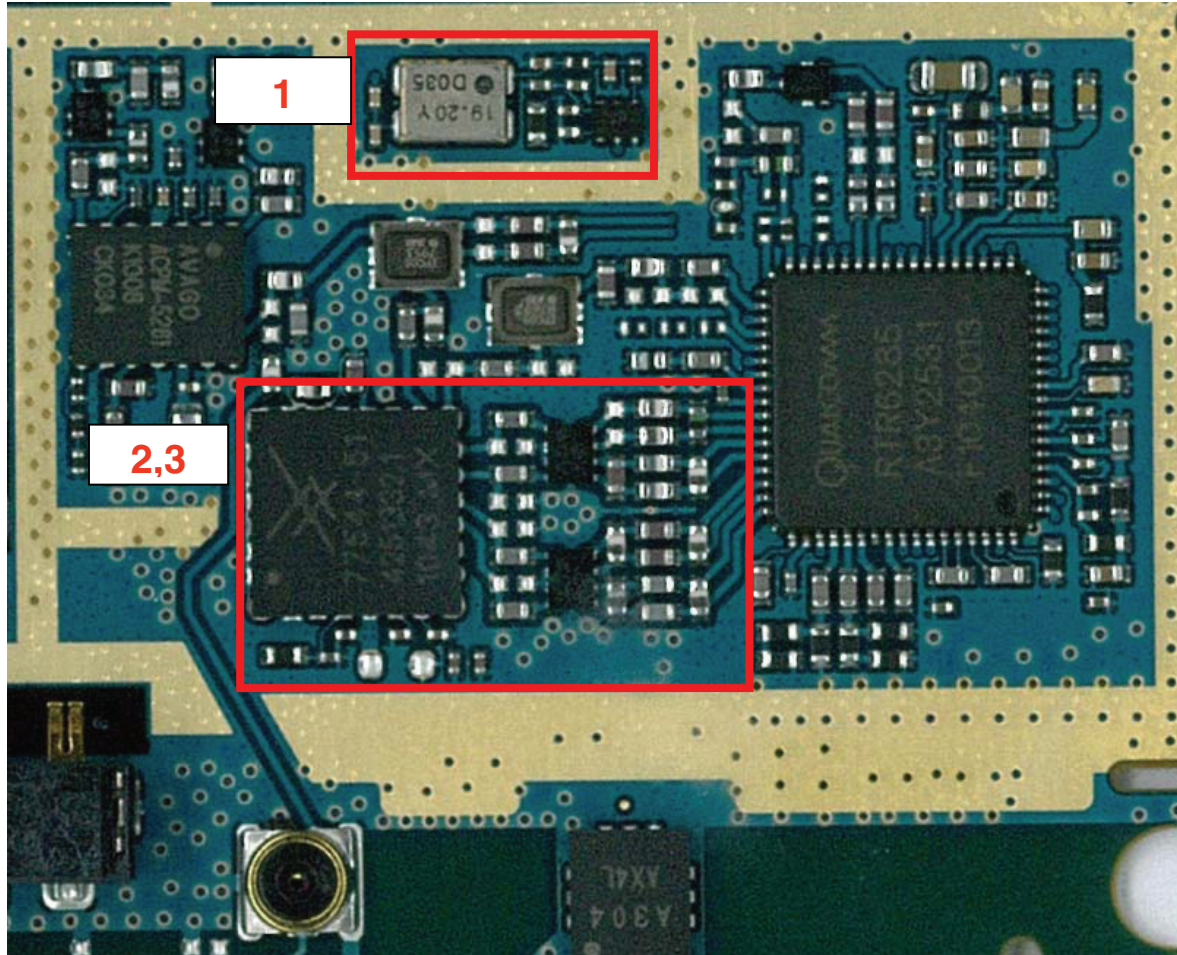
4. TROUBLE SHOOTING



4.6 Checking GSM Block



4. TROUBLE SHOOTING



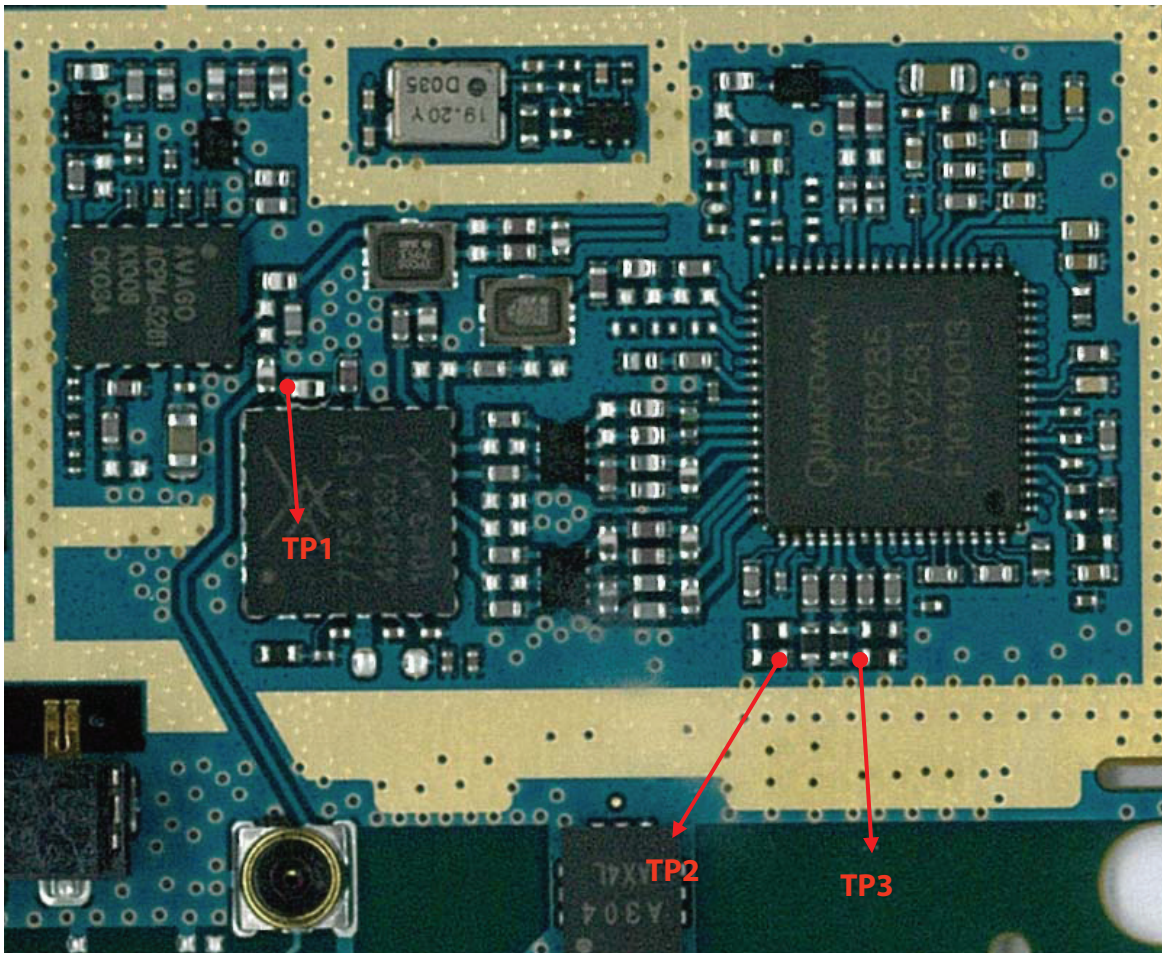
4.6.1 Checking TCXO Block

Refer to 1.3

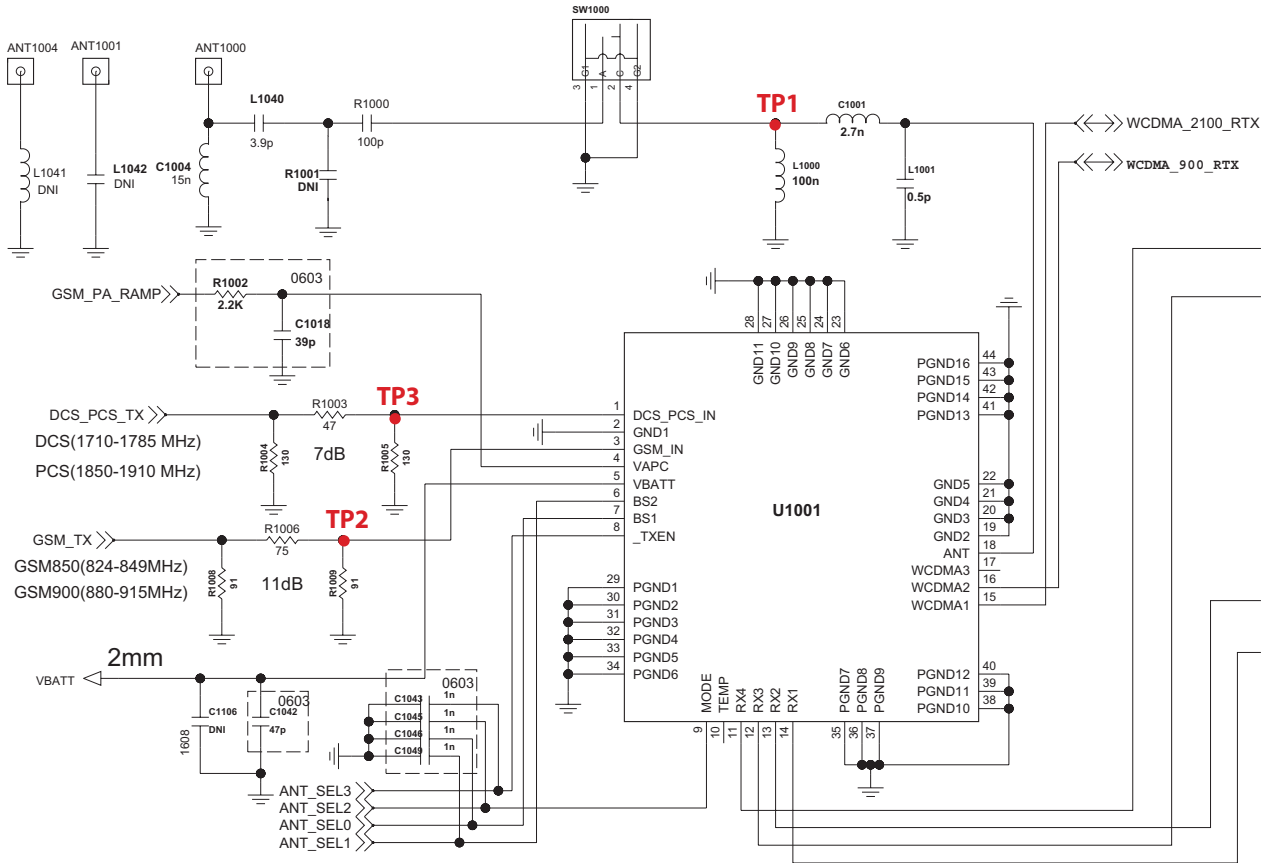
4.6.2 Checking Tx module Block

Refer to 1.4

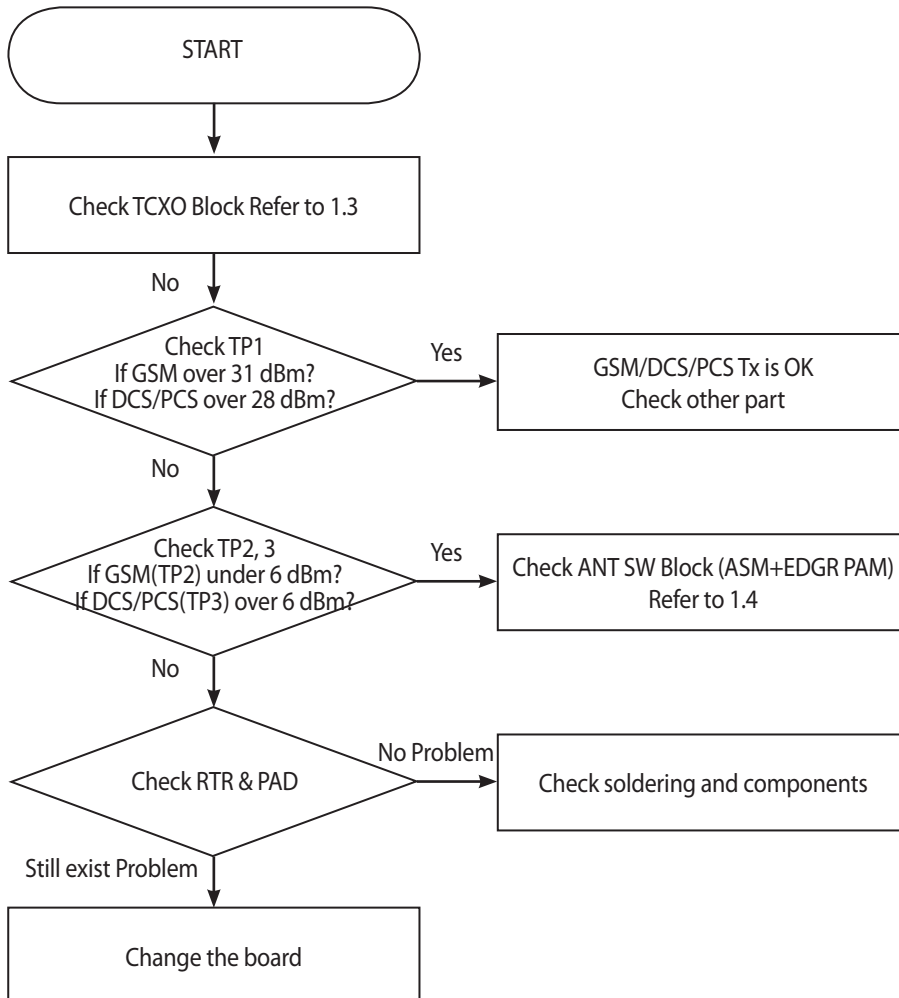
4.6.3 Checking RF TX level



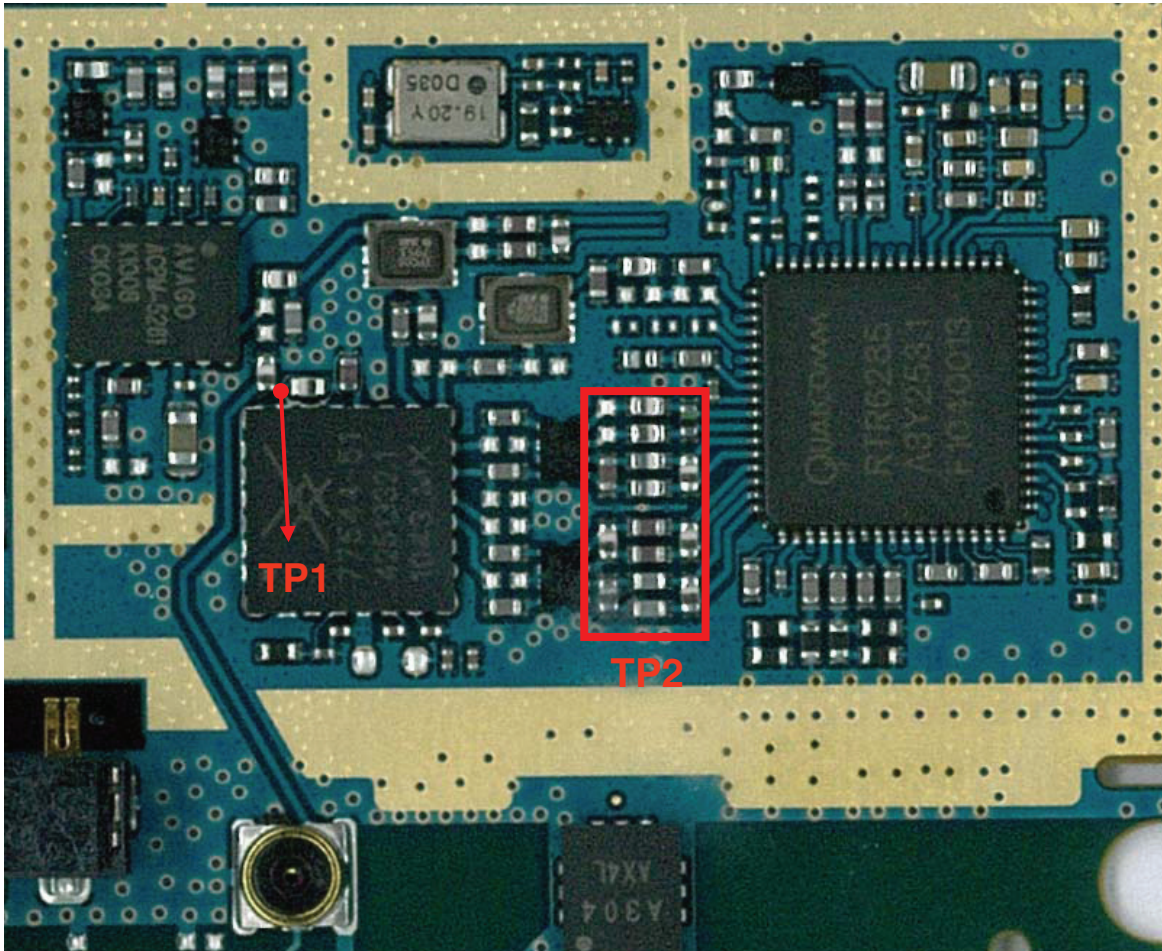
4. TROUBLE SHOOTING



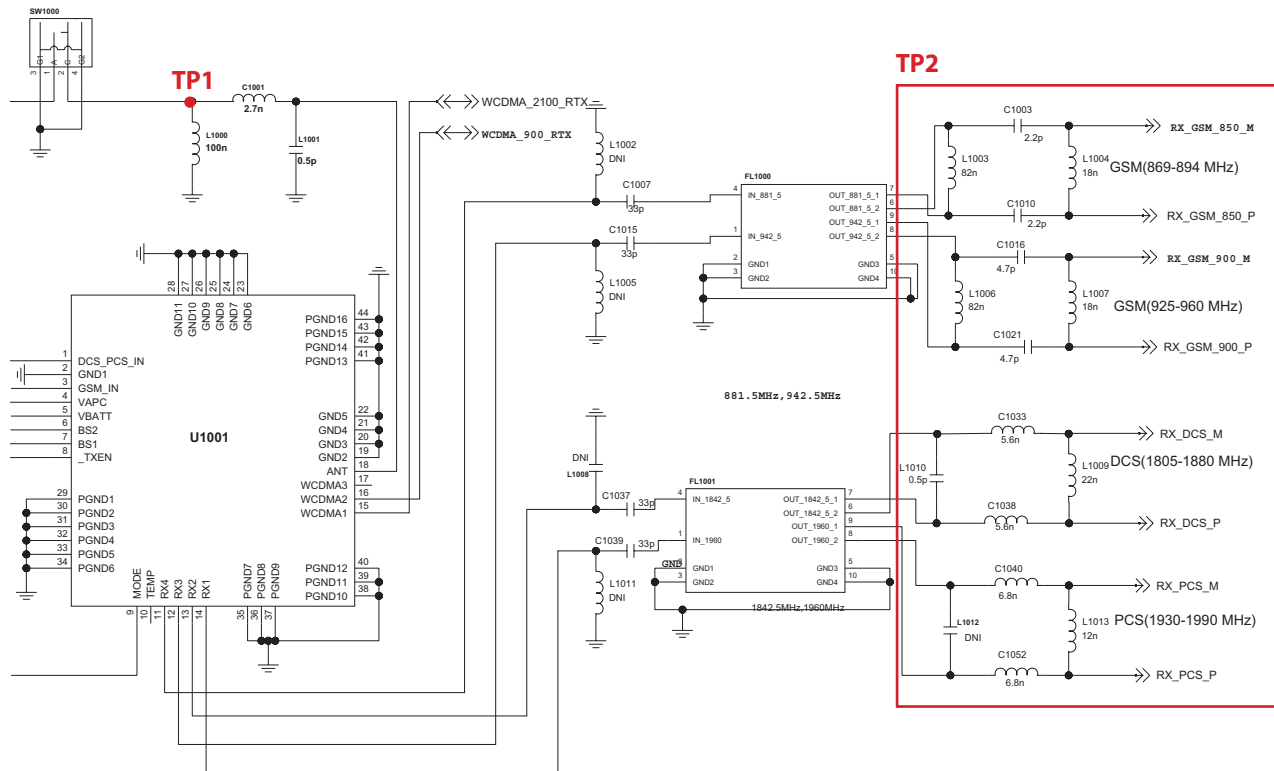
Schematic of GSM/DCS/PCS Tx Block



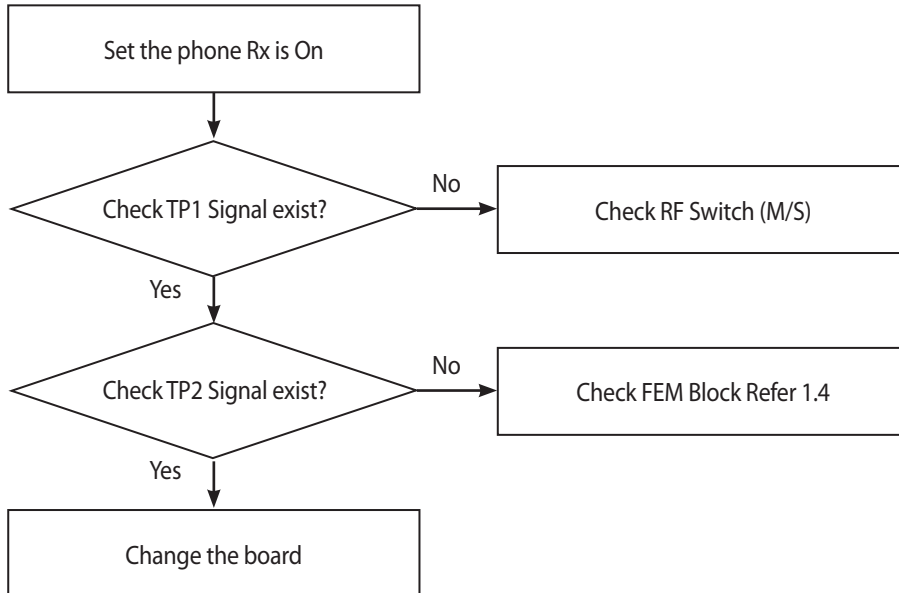
4.6.4 Checking RF Rx Block



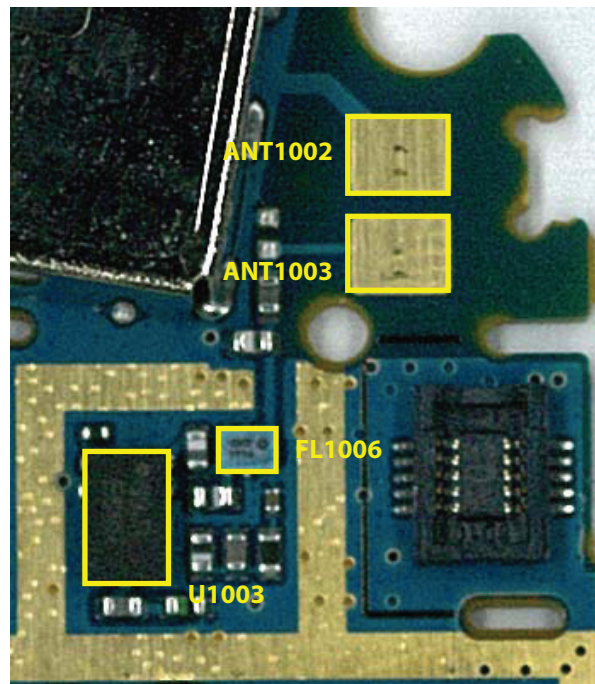
4. TROUBLE SHOOTING



Schematic of GSM/DCS/PCS Rx Block

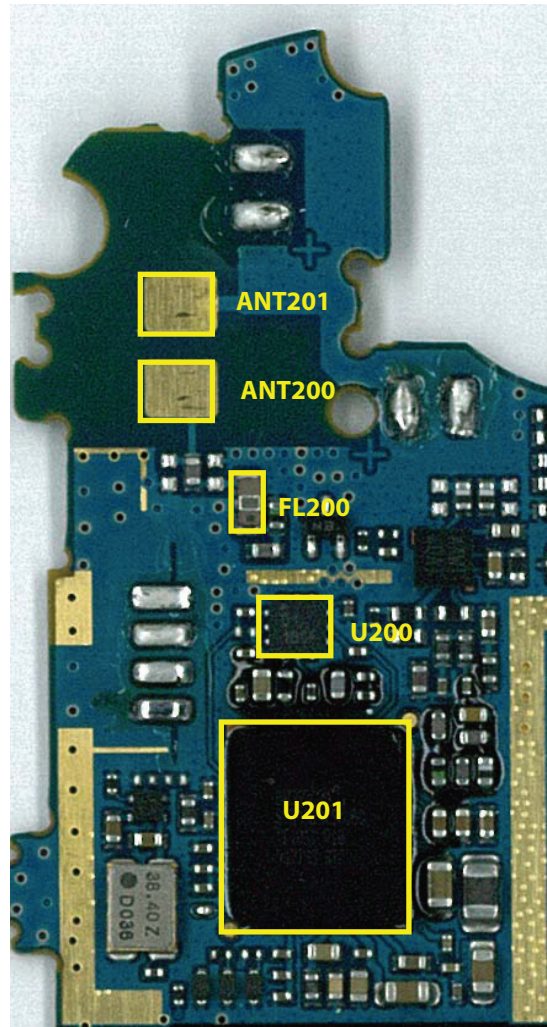


4.7 GPS/WIFI/BT RF Component



RF Components(GPS)

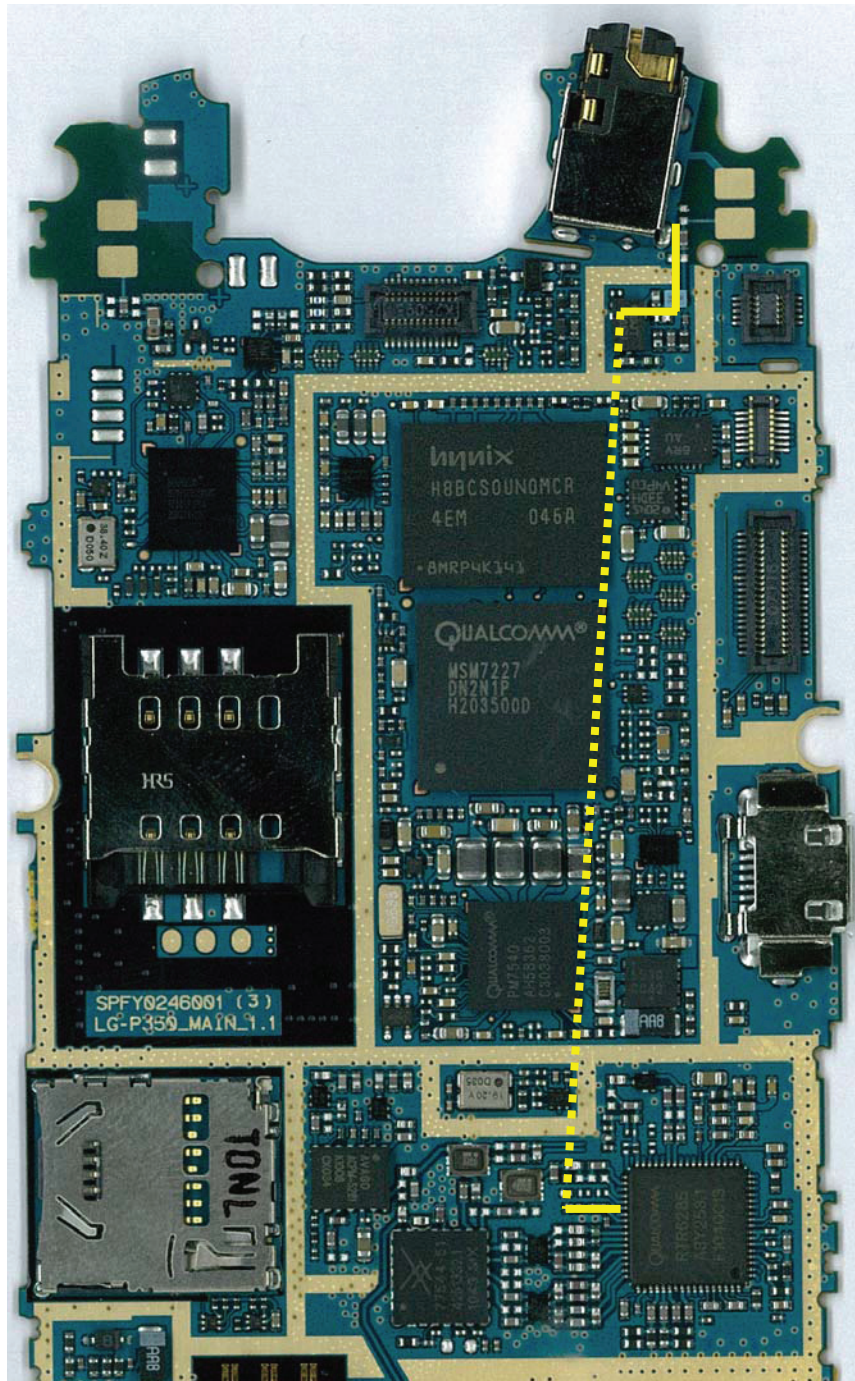
Reference	Description
ANT1003	ANTENNA PAD connected to Carrier type antenna
ANT1002	GND PAD
FL1006	GPS SAW FILTER
U1003	GPS LNA



RF component (WiFi / BT)

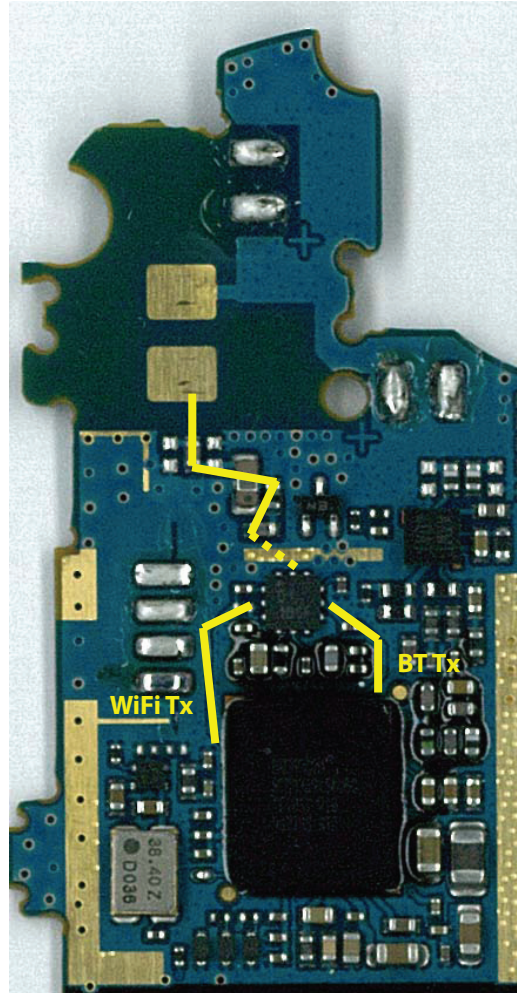
Reference	Description
ANT200	ANTENNA PAD connected to Carrier type antenna
ANT201	GND PAD
FL200	WiFi / BT Filter
U200	SP3T + LNA for WiFi / BT
U500	WiFi / BT chip

4.8 GPS/WIFI/BT SIGNAL PATH



GPS Signal PATH (main board bottom)

GPS Rx PATH

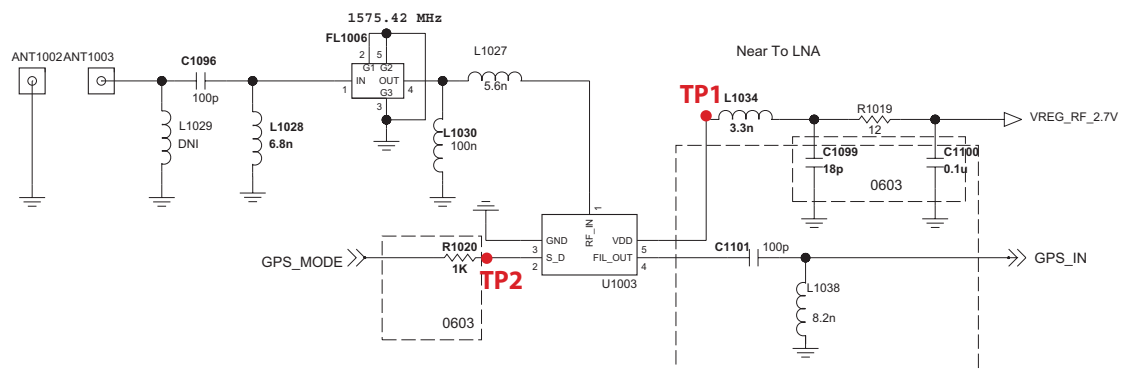
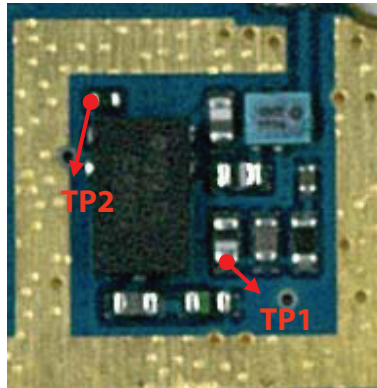


WiFi / BT Signal PATH

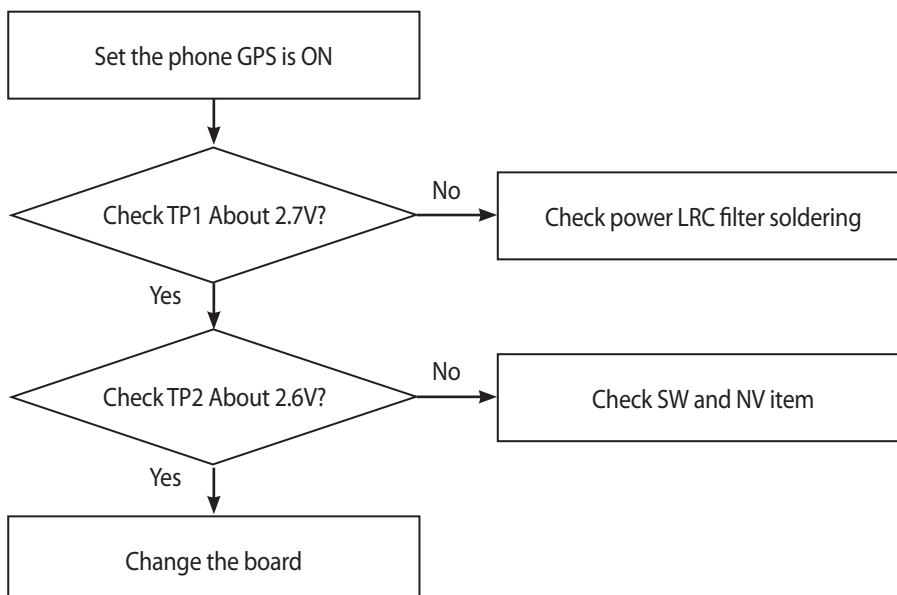
WiFi / BT Tx and Rx PATH

4.9 GPS/WIFI/BT Trouble shooting

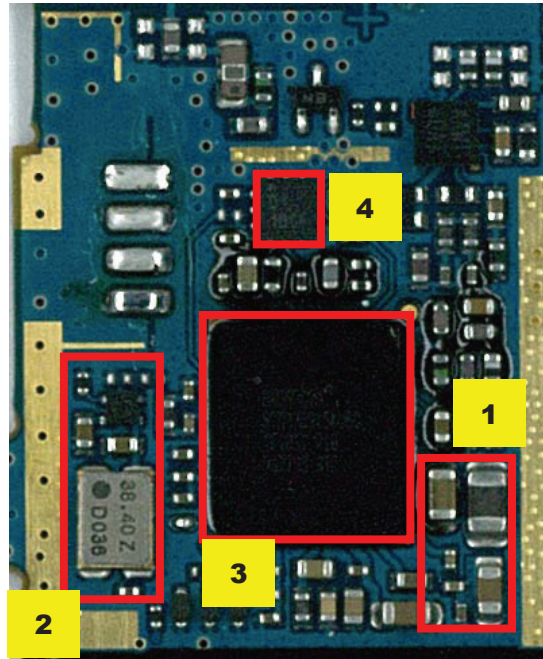
4.9.1 A-GPS Block



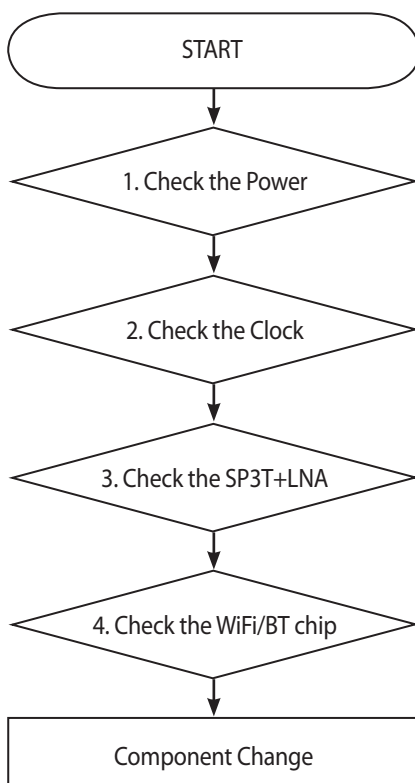
Schematic of the A-GPS block



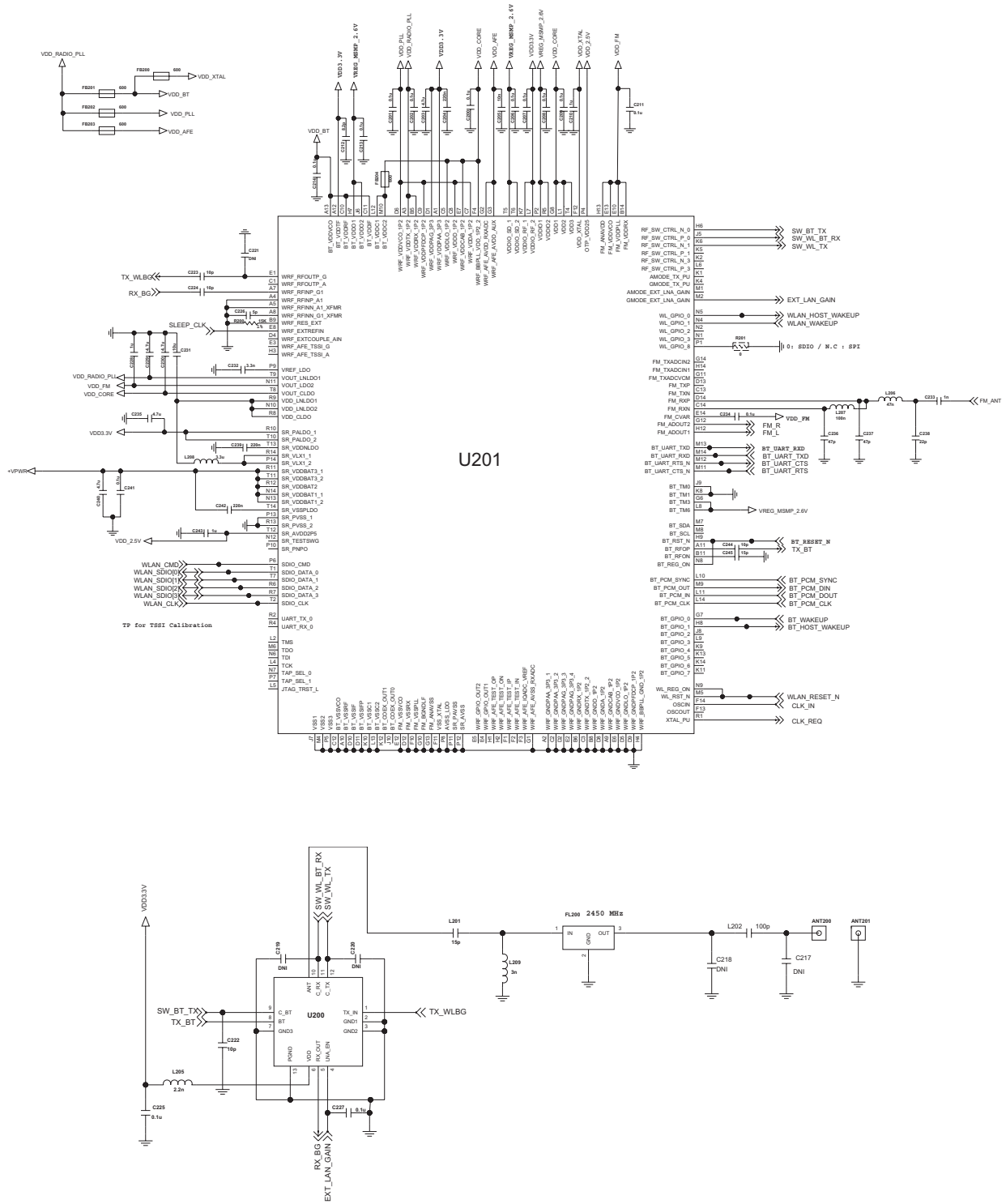
4.9.2 WLAN/BT/FM Block



Checking Flow

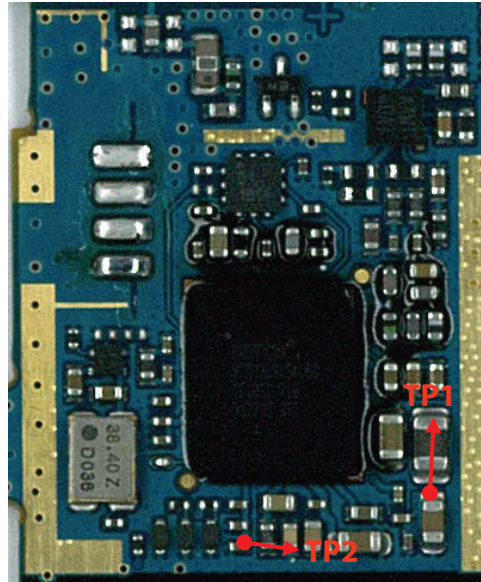


4. TROUBLE SHOOTING



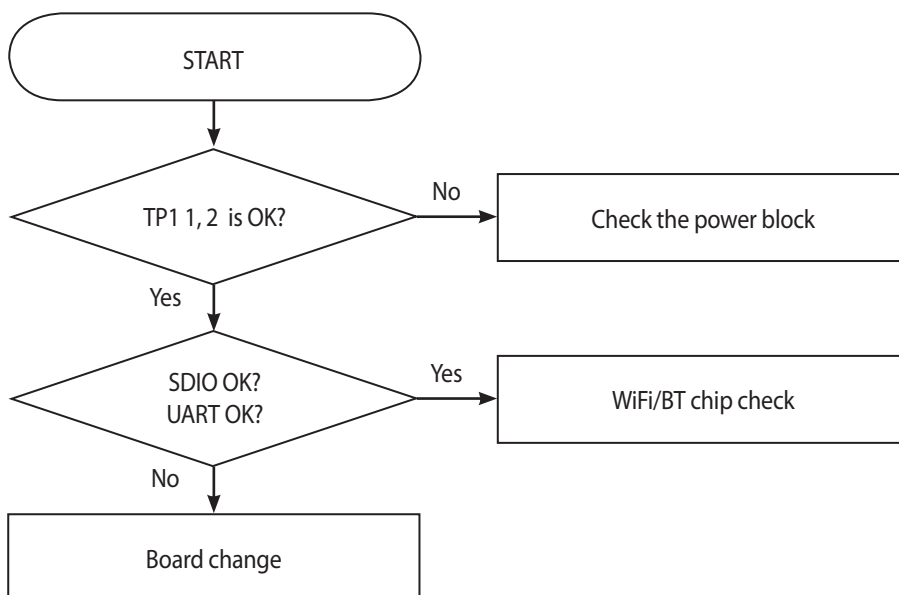
[Figure] Schematic of WiFi/BT/FM

4. TROUBLE SHOOTING

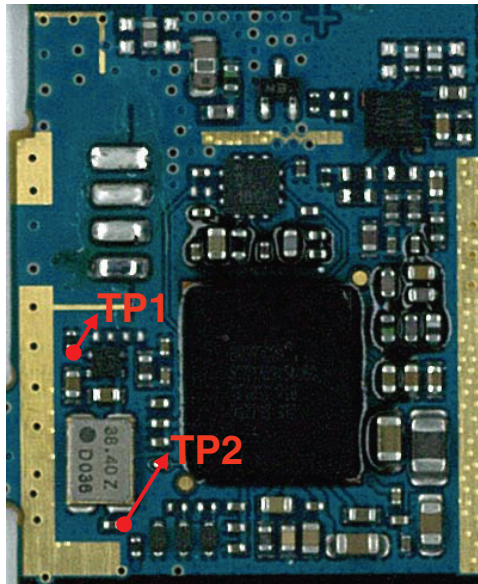
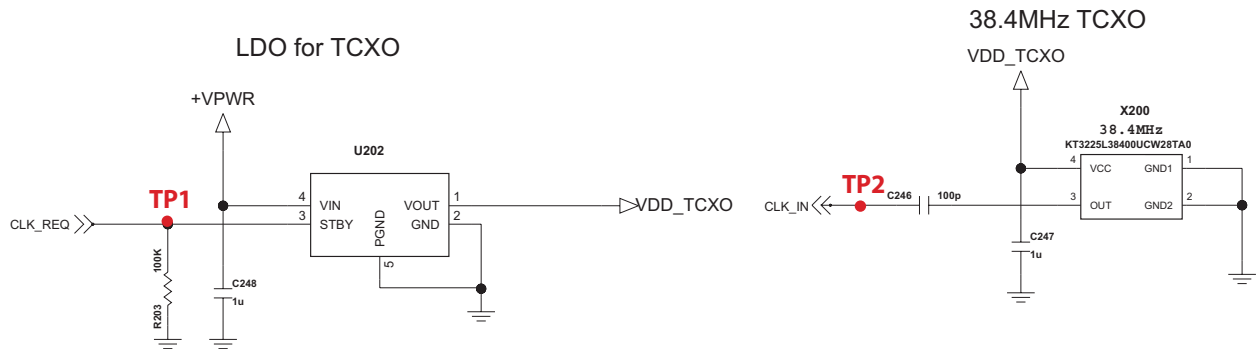


Test point	Net name	Description
TP1	+VPWR	Power for BT/WiFi BB core and WiFi power Amp. (V Batt)
TP2	VREG_MSMP_2.6V	Power for BT power Amp.and Host interface (2.6V)

Checking Flow



4. TROUBLE SHOOTING



Test Point	Net name	Description
TP1	CLK_REQ	On/Off Control external clock source 0 : TCXO off 1 : TCXO on
TP2	XTALP	TCXO output clock : 26MHz

Test Point of TCXO

4. TROUBLE SHOOTING



- Bluetooth RF Test procedure

1. Set phone to Bluetooth test-mode.

- Blue tooth ON: Enter Test Mode(277634##*) → Module test set → BT DUT → BT DUT ON

2. Insert a phone in a TEMCELL (in case of radiation test)

3. Set 'discover' after push menu button of the tester and select the link analyzer.

4. After 'set test mode', confirm the connection state.

5. Measure the power of full channel after hopping mode is selected to 'ON'

6. You can select wanted test cases after getting an optimized power

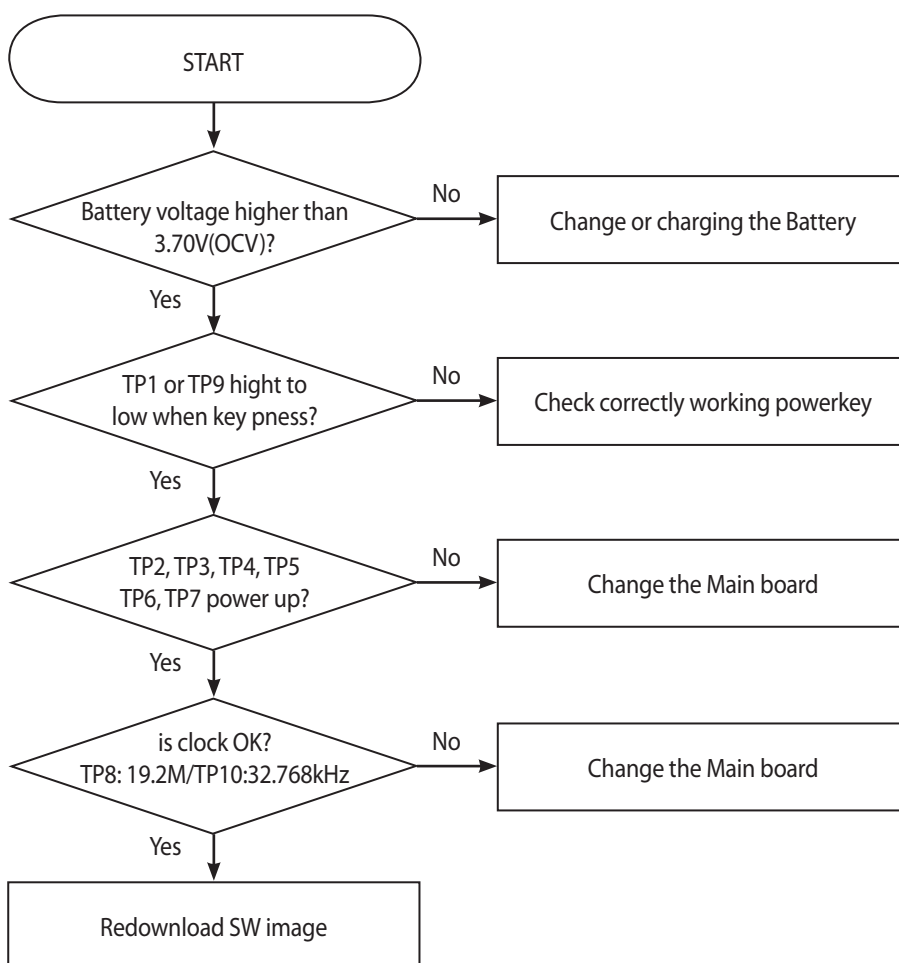
7. Blue tooth On/Off

- Menu Key → settings → Wireless controls → Bluetooth → Turn on/Turn off

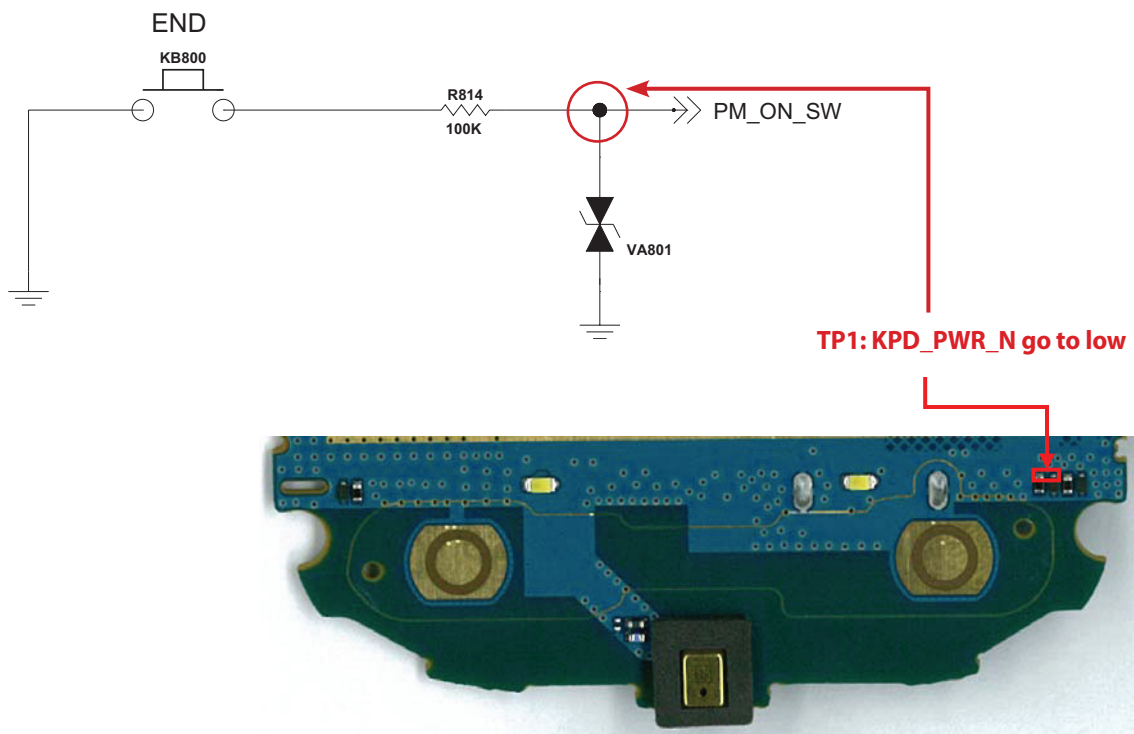
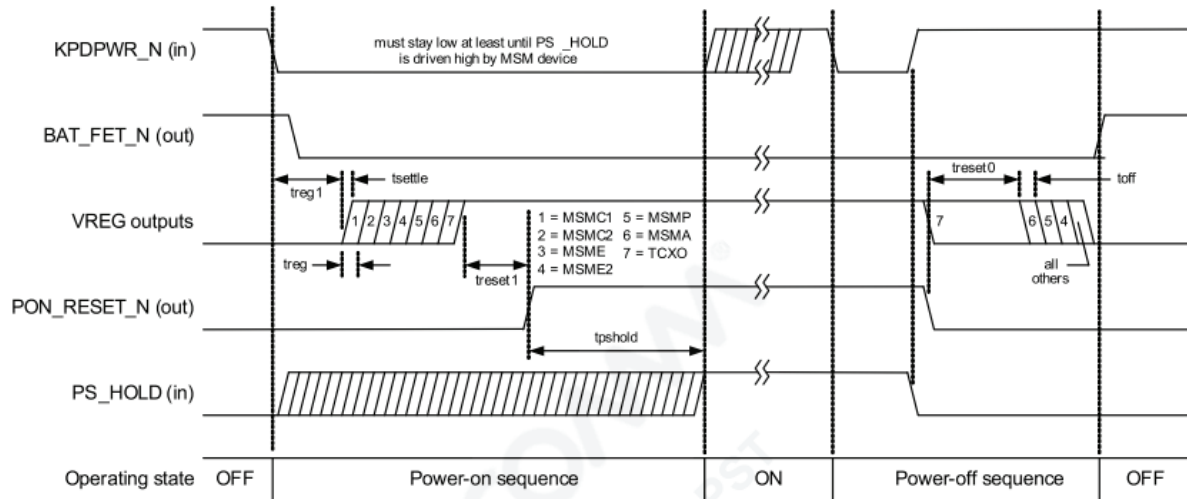
4.10 Power ON Troubleshooting

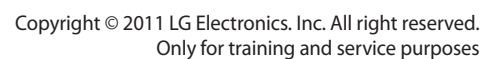
Power On sequence of P350 is :

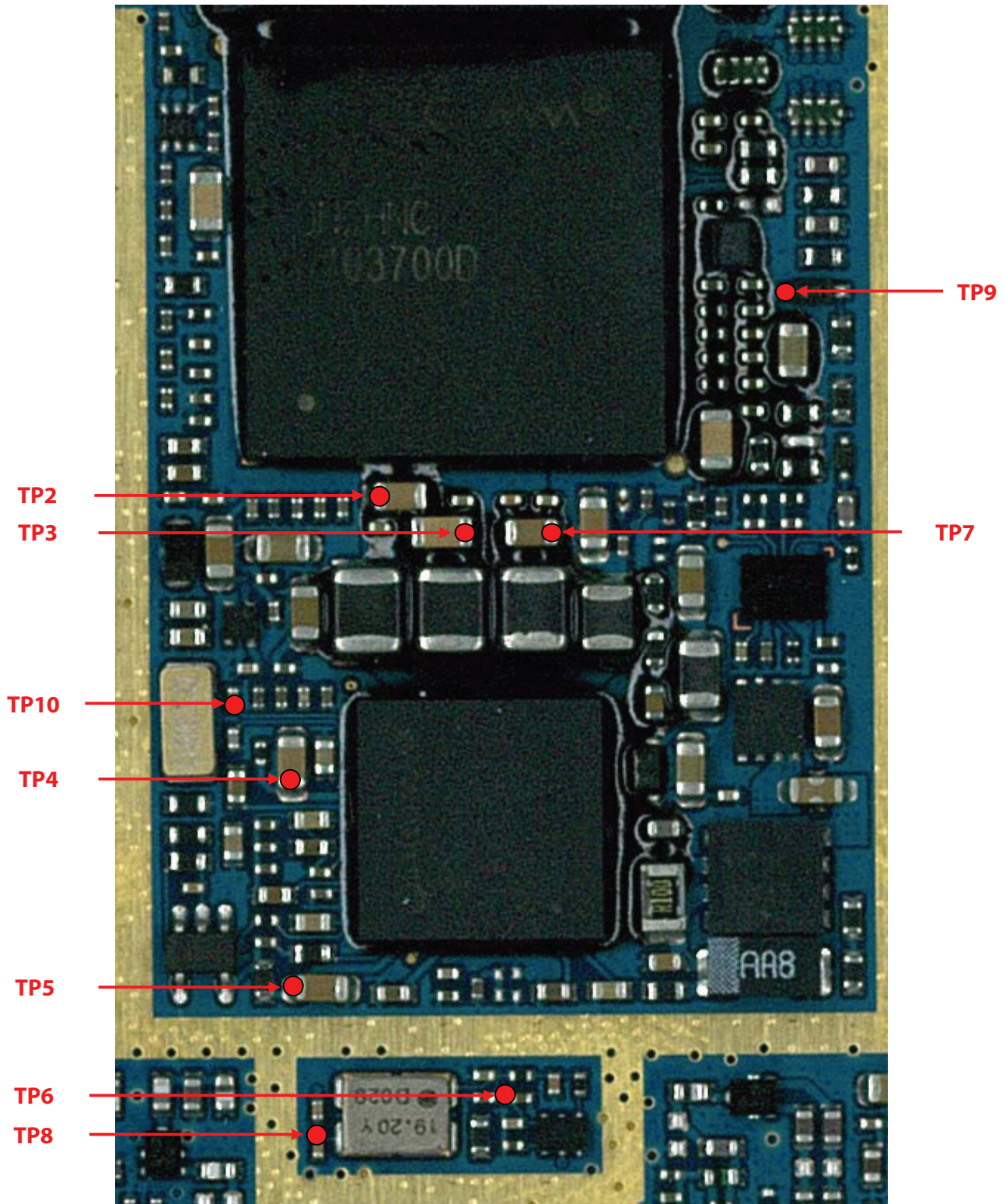
Power key press → TP1 go to low → PM7540 Power Up → TP3(C525), TP7(C526), TP2(C527), TP4(C542), TP5(C541), TP6(C546) power ON → Phone booting and TP9(D501) go to High



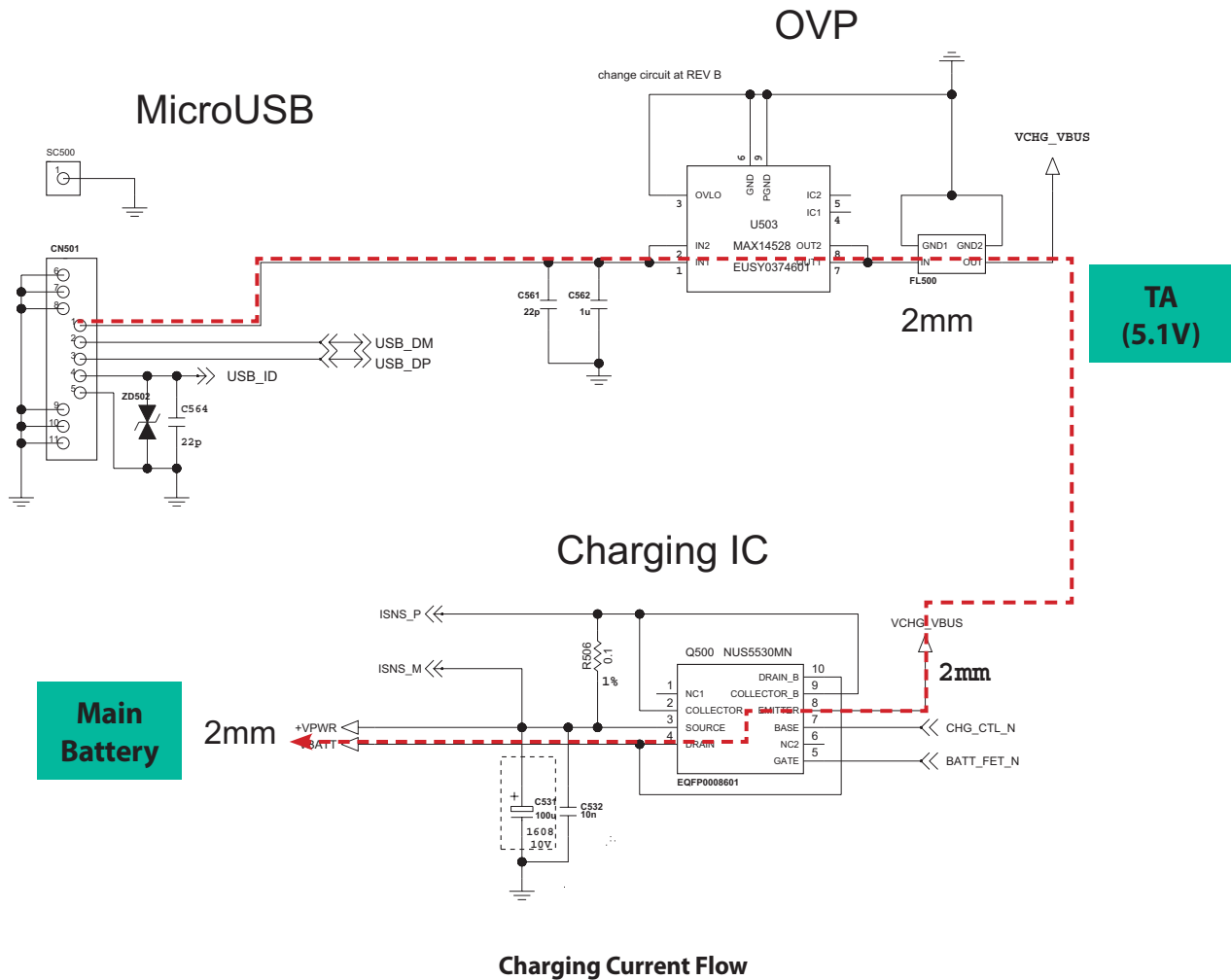
4. TROUBLE SHOOTING







4.11 Charging Trouble shooting



Charging Current Flow

Charging Procedure

- Connect TA or u-USB Cable
- Control the charging current by PM7540 IC
- Charging current flows into the battery

Check Point

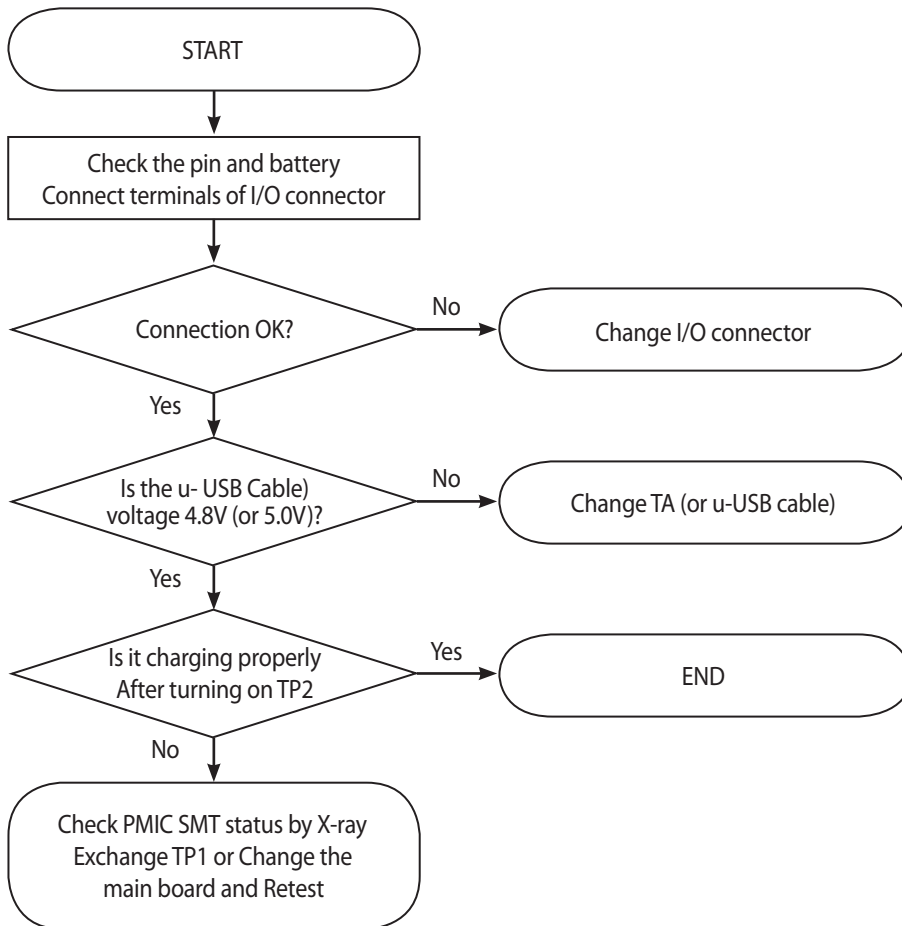
- Connection of TA or USB Cable
- Charging current path(NUS5530MIN)
- Battery

Troubleshooting Setup

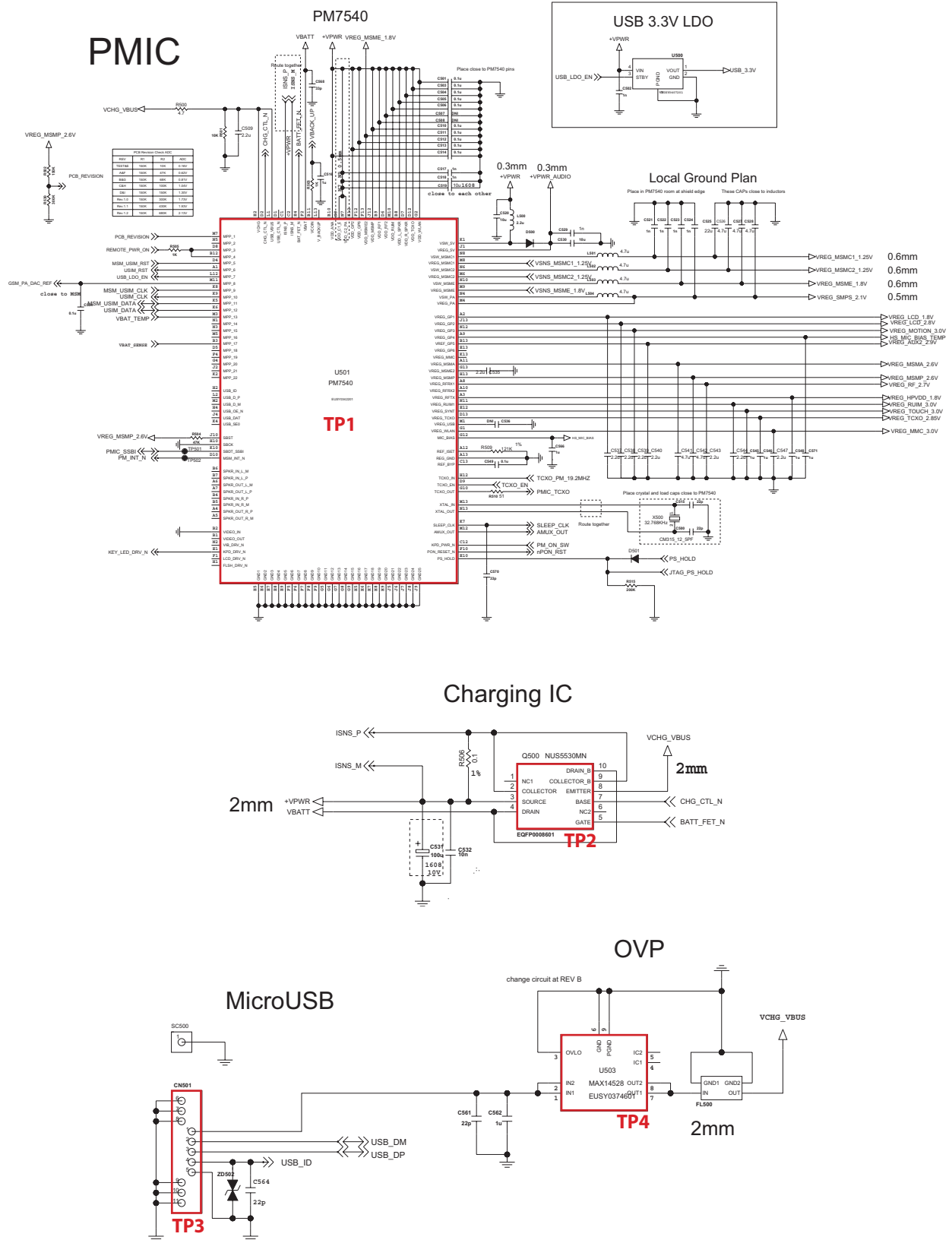
- Connect TA and battery to the phone

Troubleshooting Procedure

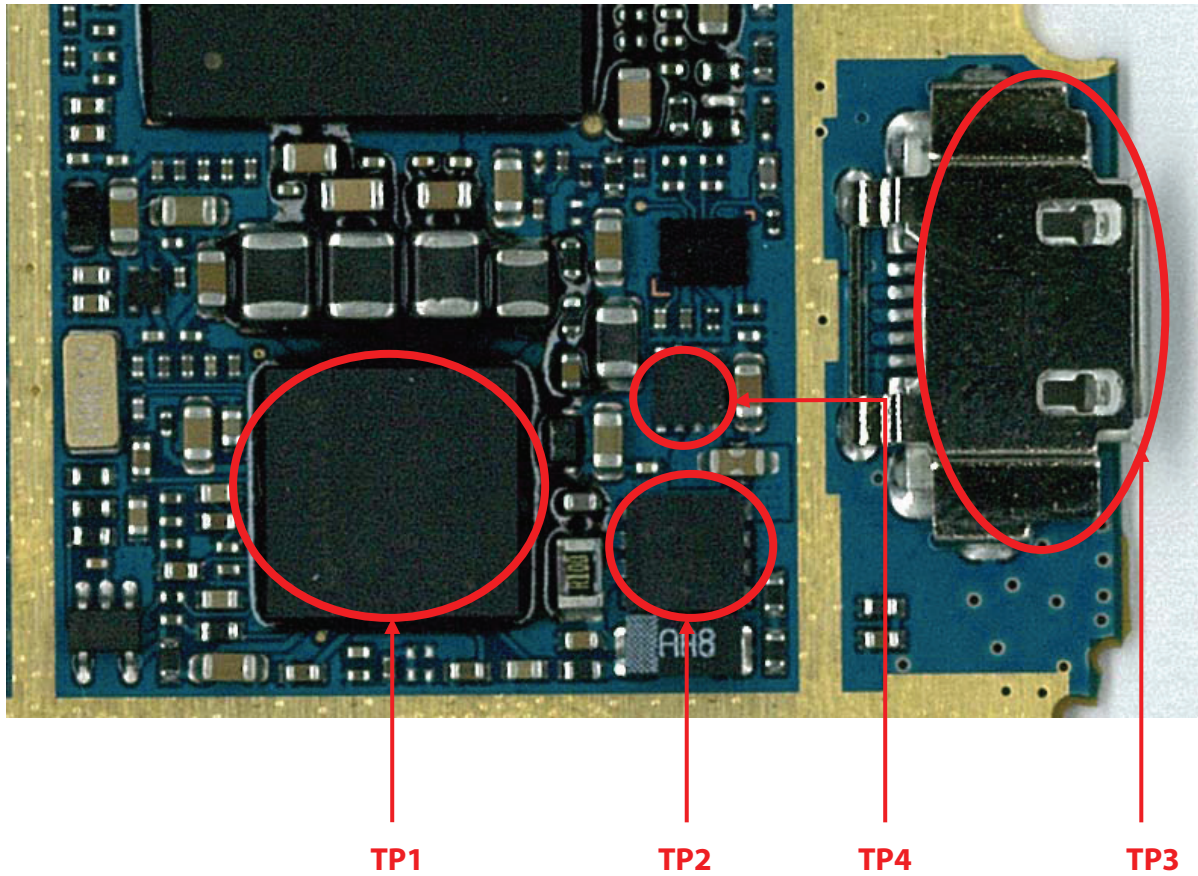
- Check the charger (TA or USB Cable) connector
- Check the OVP Circuit
- Check the charging current Path
- Check the battery



4. TROUBLE SHOOTING

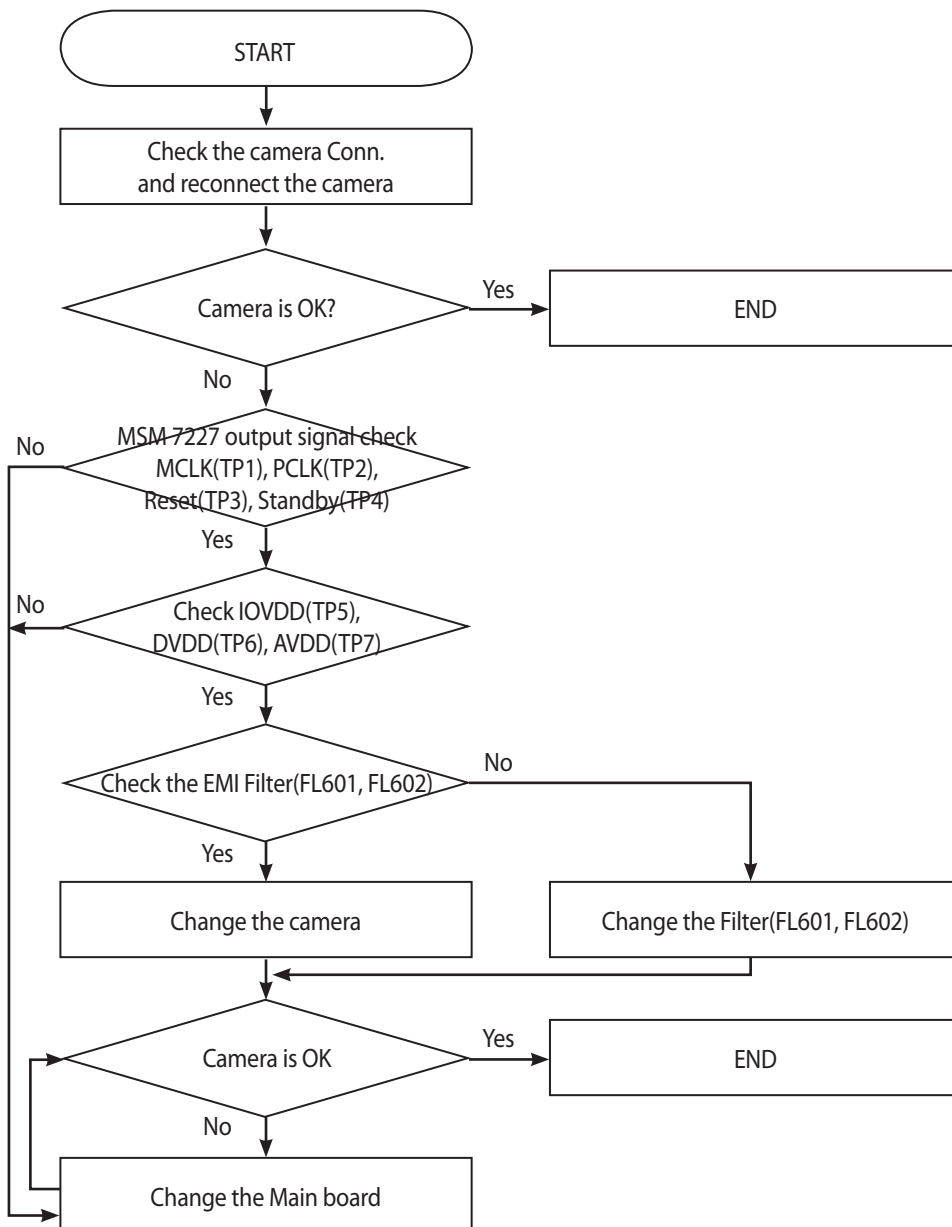


4. TROUBLE SHOOTING

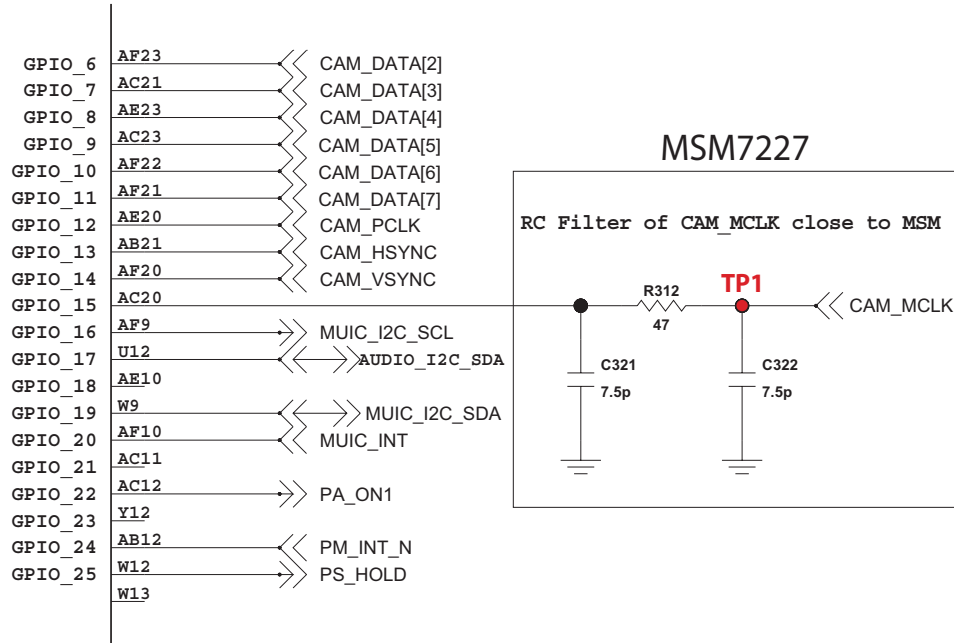


4.12 3M FF Camera trouble

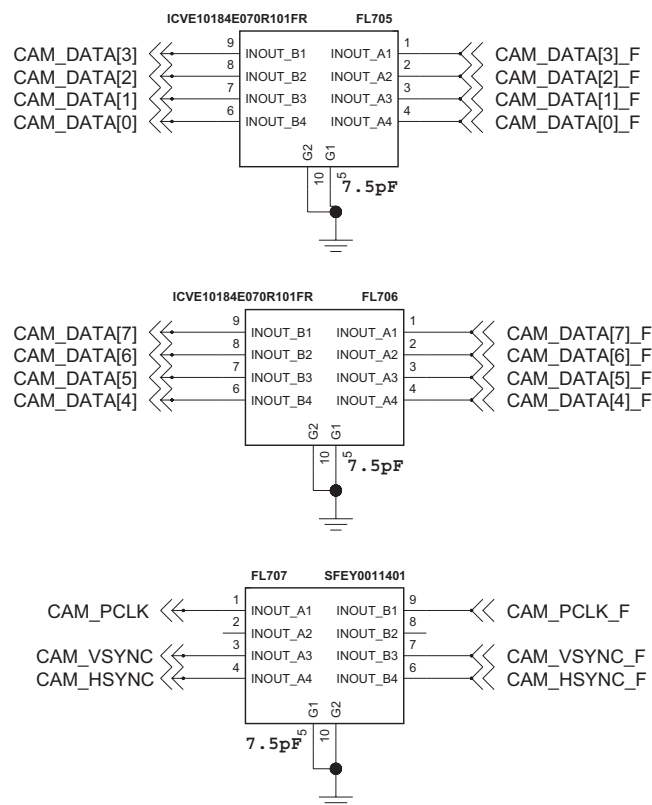
3M camera control signals are generated by MSM7227.



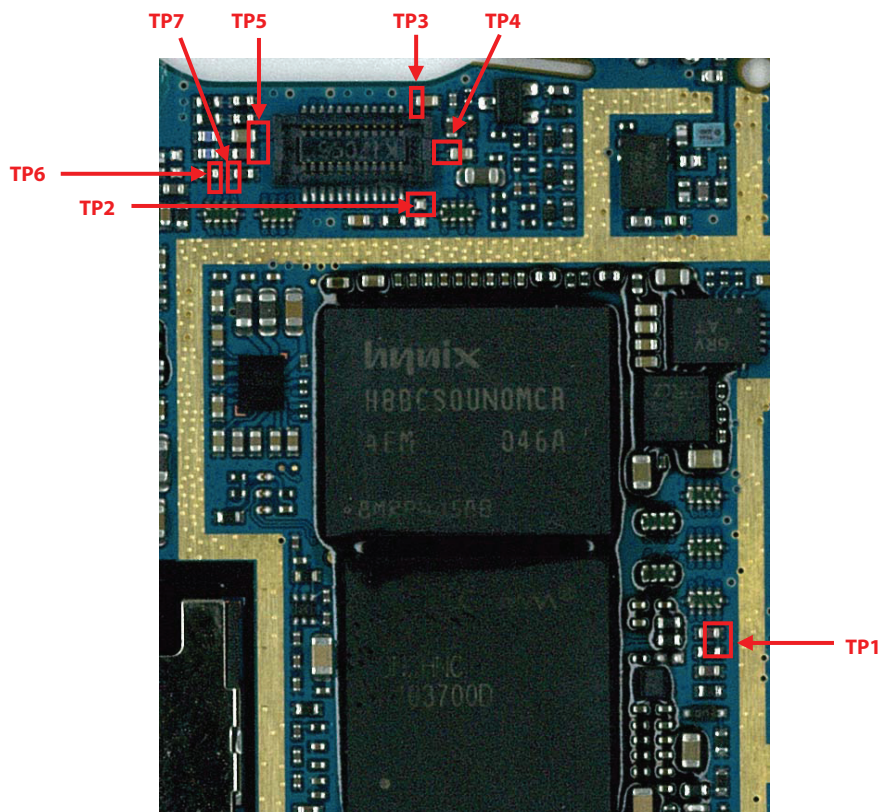
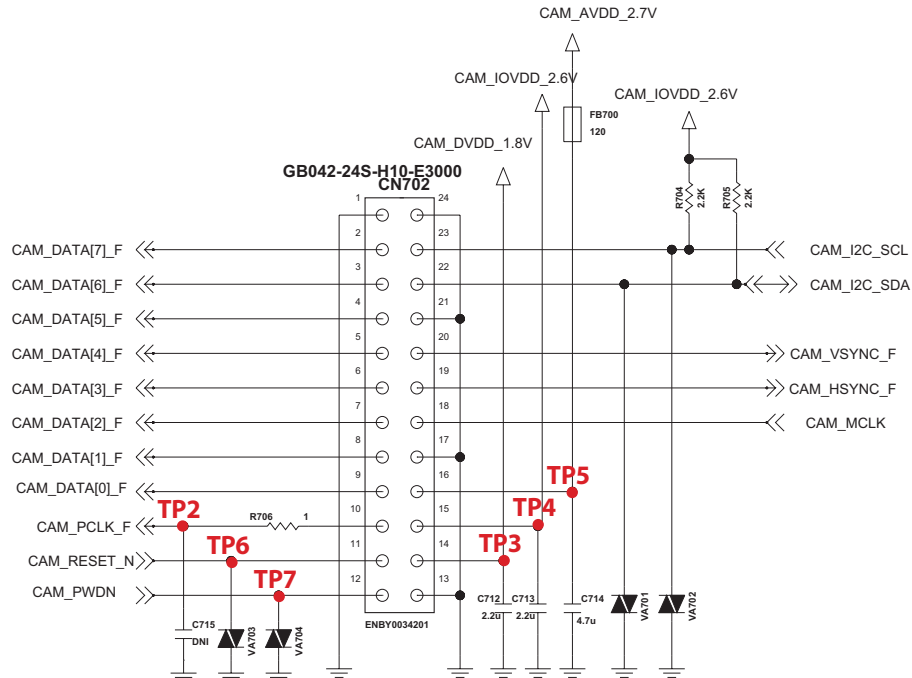
4. TROUBLE SHOOTING



EMI FILTER



4. TROUBLE SHOOTING

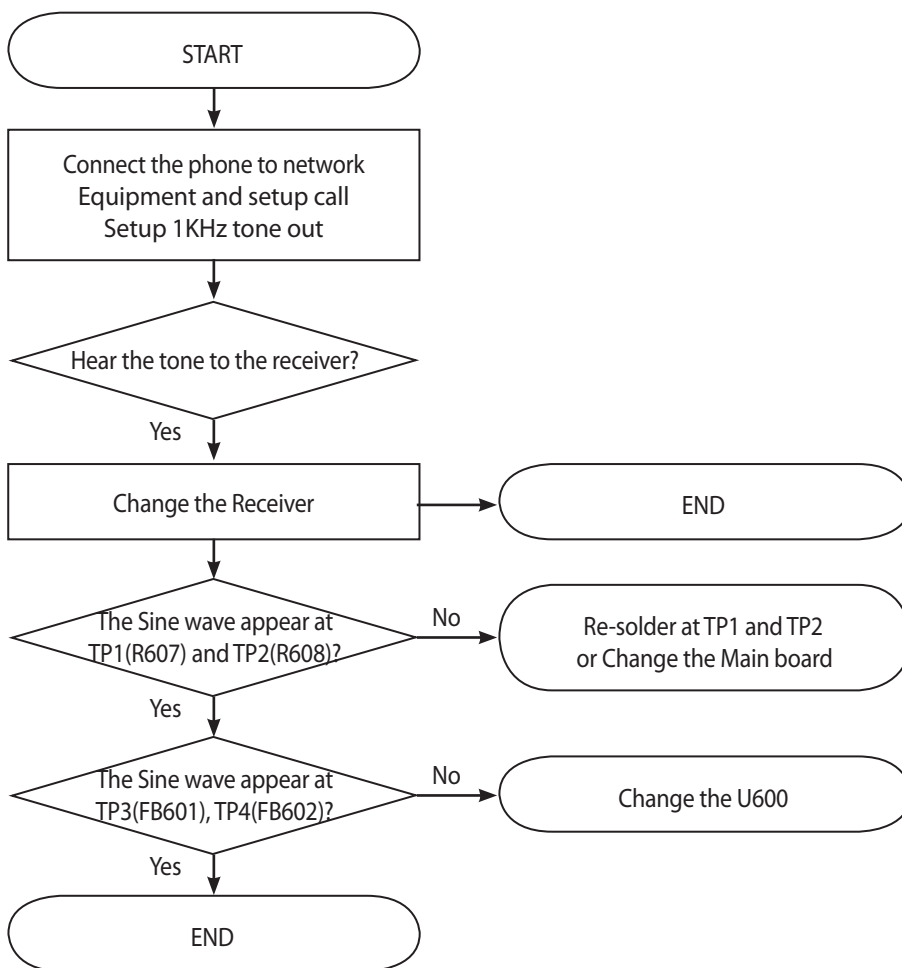


4.13 Audio Trouble

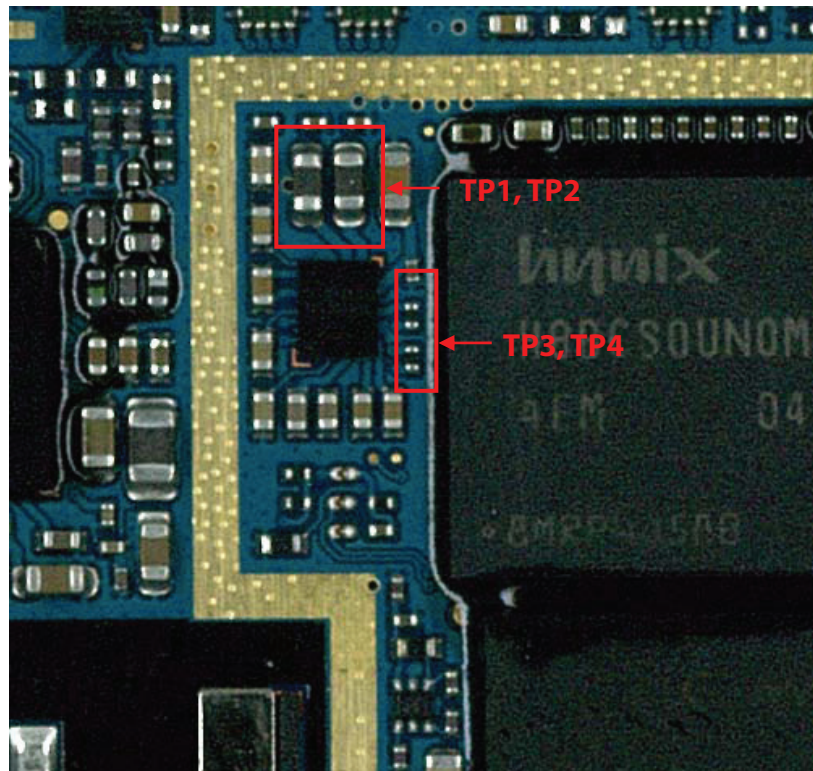
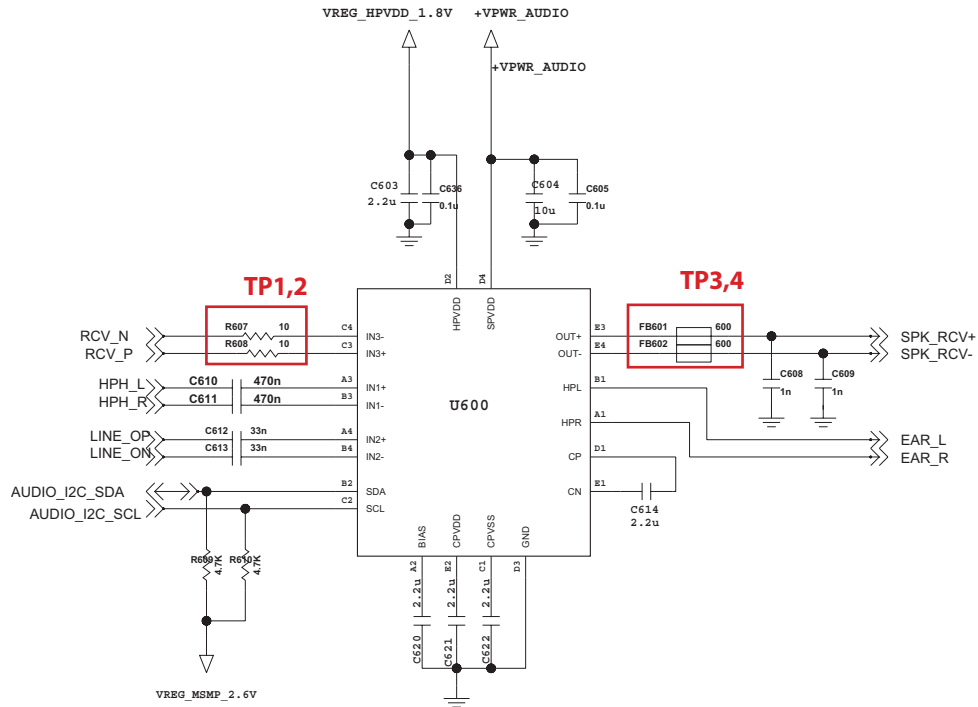
4.13.1. Receiver. path

Voice Receiver path as below:

MSM7227 RCV_N / RCV_P → TP1(R607), TP2(R608) → U600 (Audio Subsystem) → TP3(FB601), TP4(FB602) → SPK/RCV Pad.



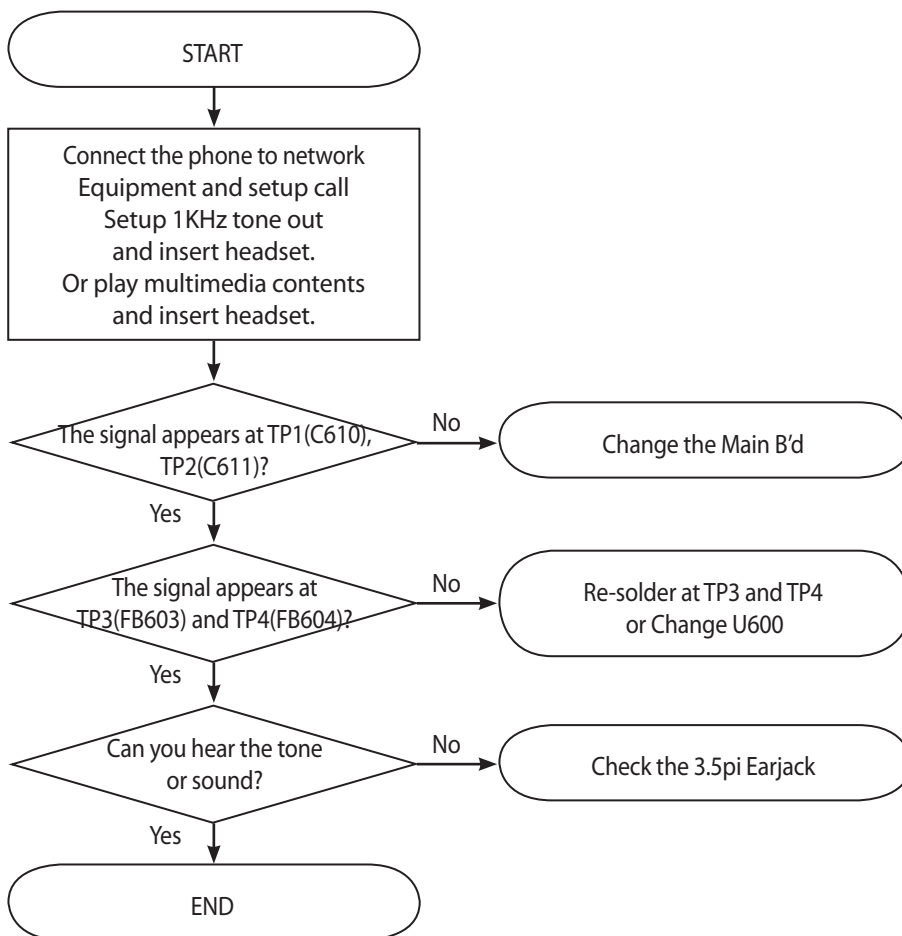
4. TROUBLE SHOOTING



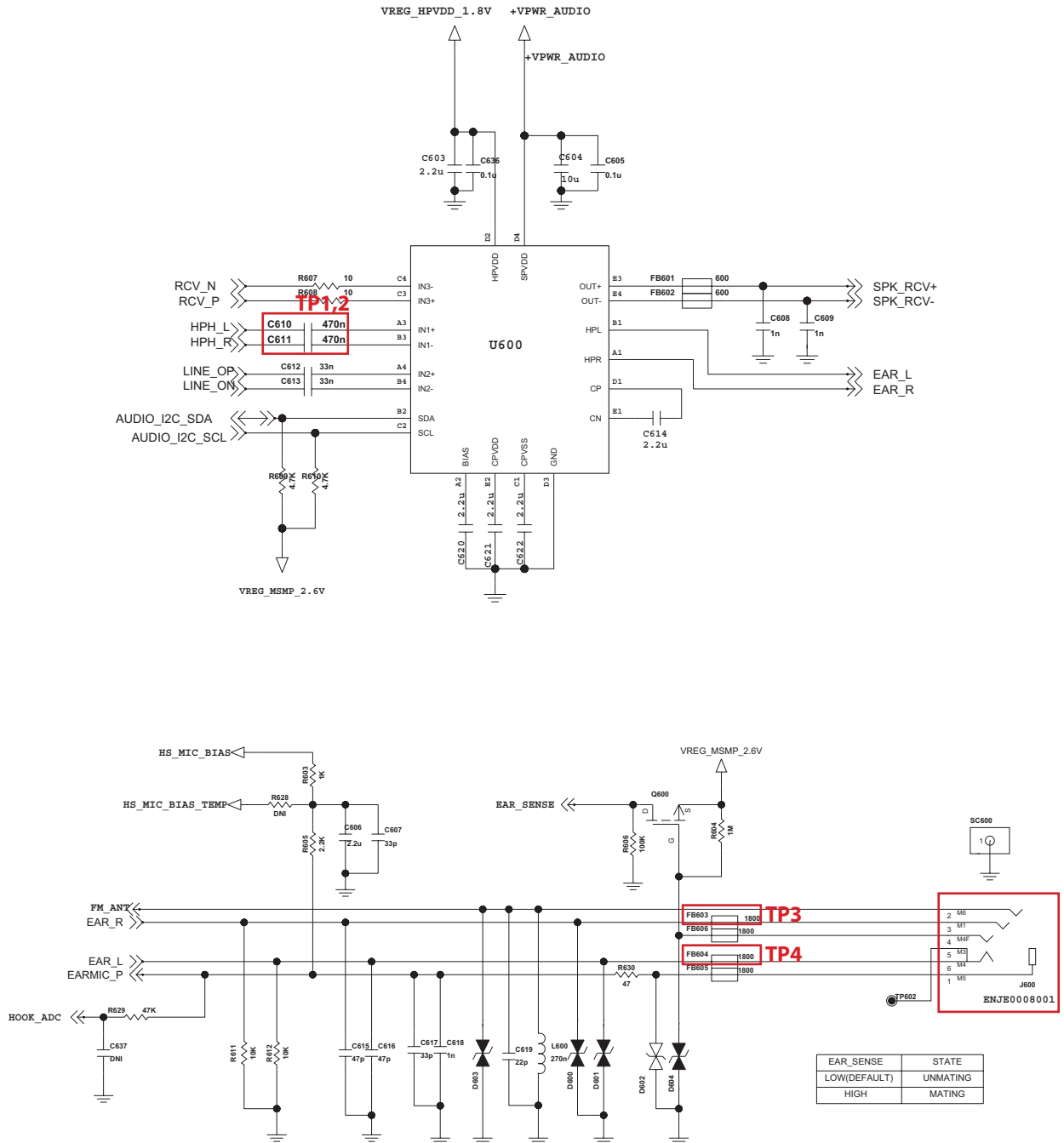
4.13.2. Headset path (Voice & Multimedia play)

Voice path & Multimedia play for headset as below:

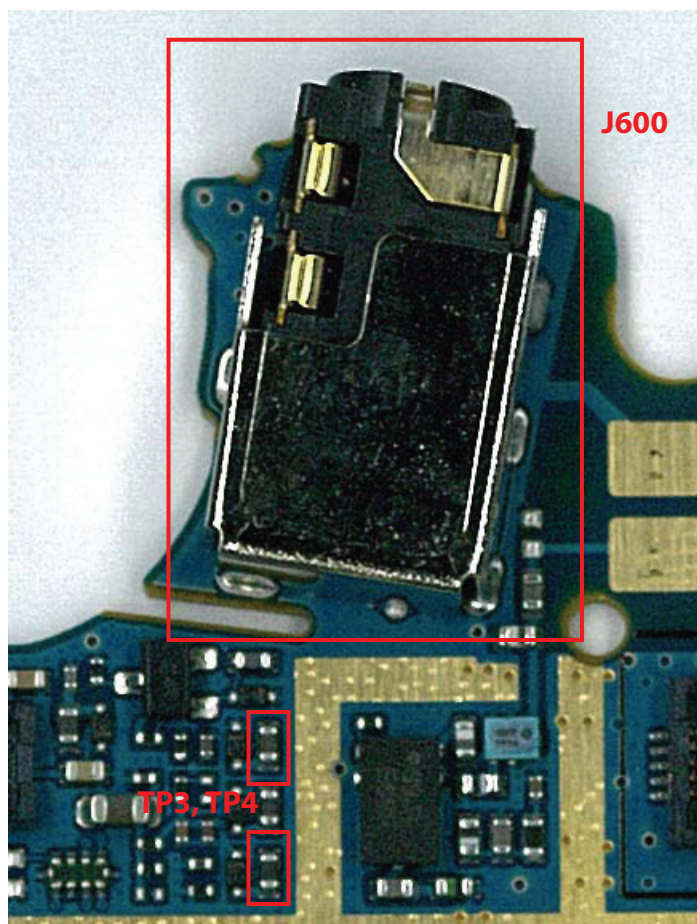
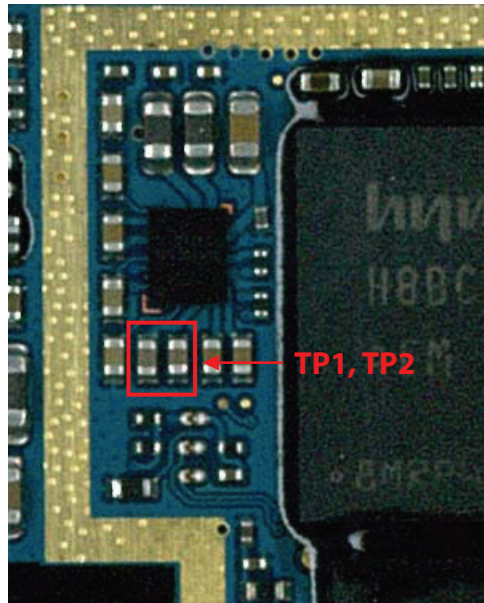
MSM7227 HPH_R, HPH_L → TP1(C610), TP2(C611) → U600(audio subsystem) → TP3(FB603), TP4(FB604)
→ J600(Earjack connector)



4. TROUBLE SHOOTING



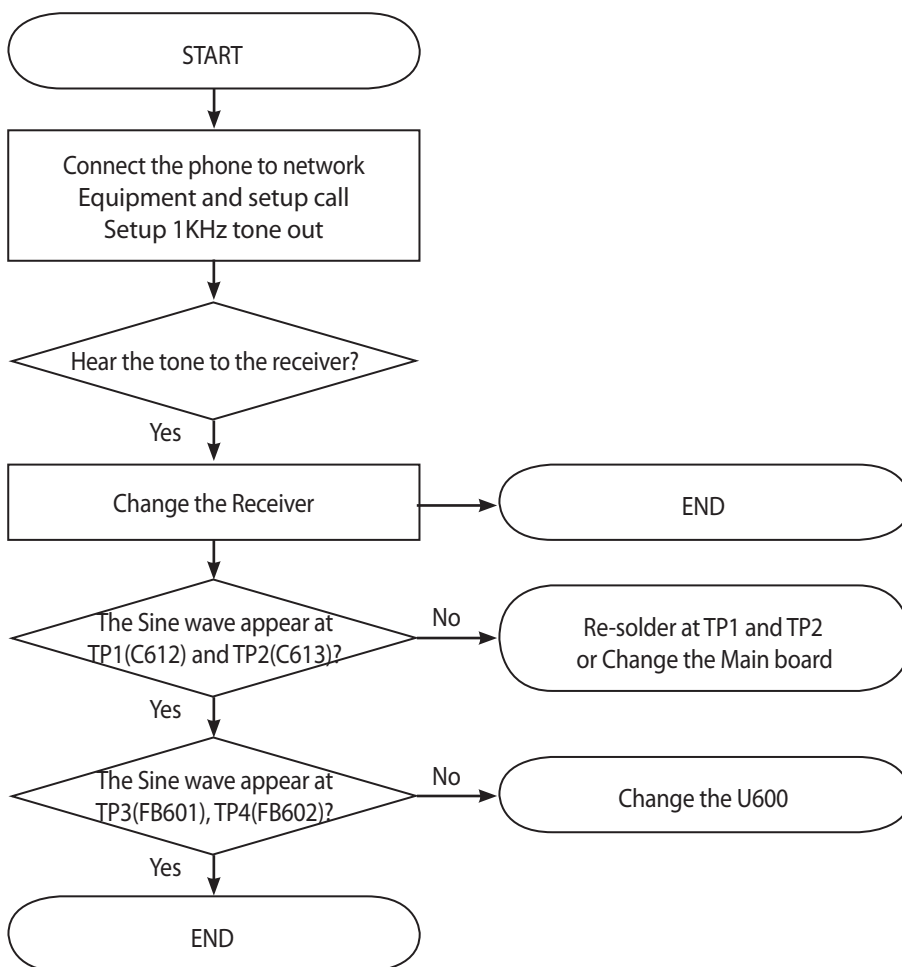
4. TROUBLE SHOOTING



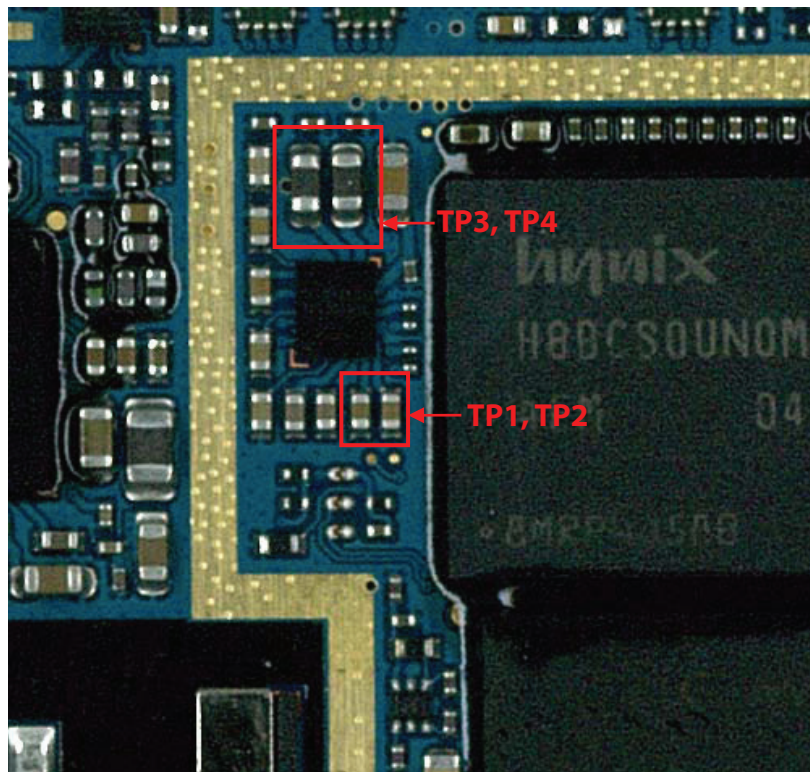
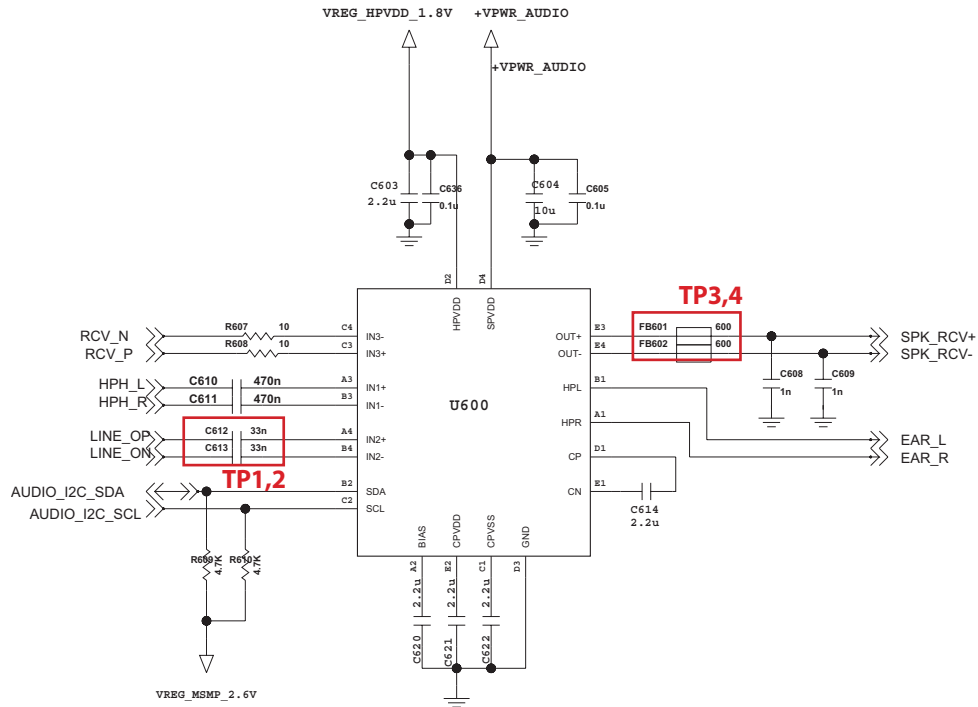
4.13.3. Loud speaker path (voice speaker phone & multimedia play)

Loud speaker path as below:

MSM7227 LINE_OP, ON → TP1(C612),TP2(C613) → U600(Audio subsystem) → TP3(FB601), TP4(FB602)
→ SPK/RCV Pad.



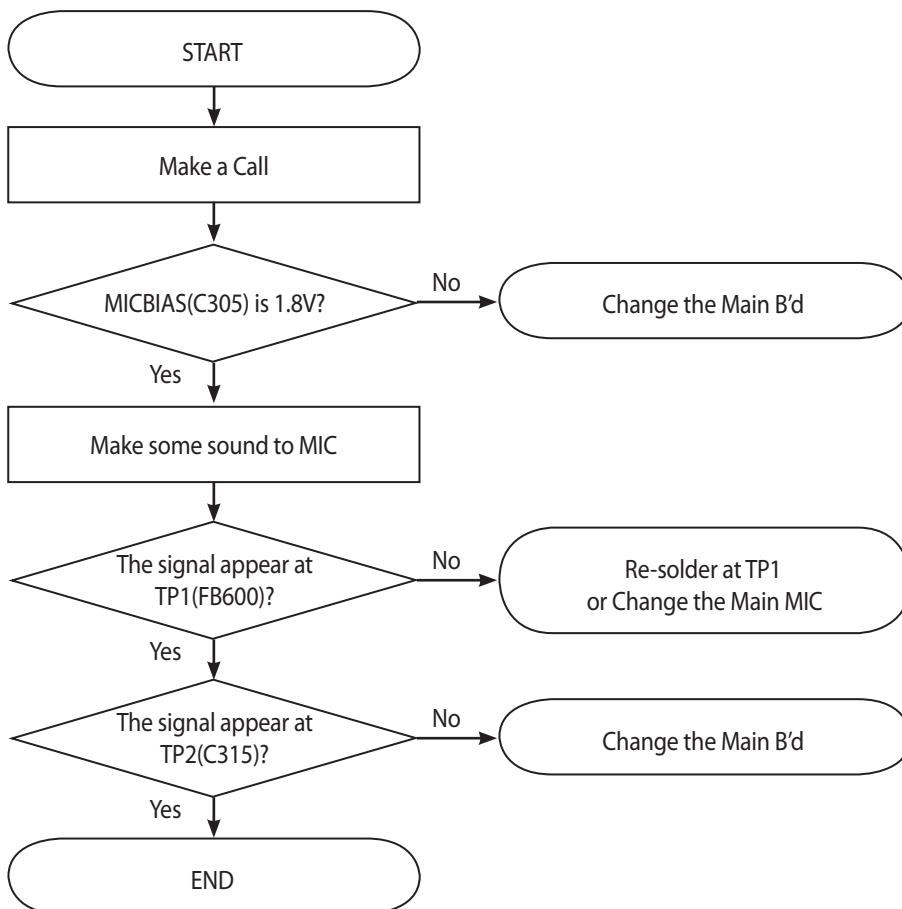
4. TROUBLE SHOOTING

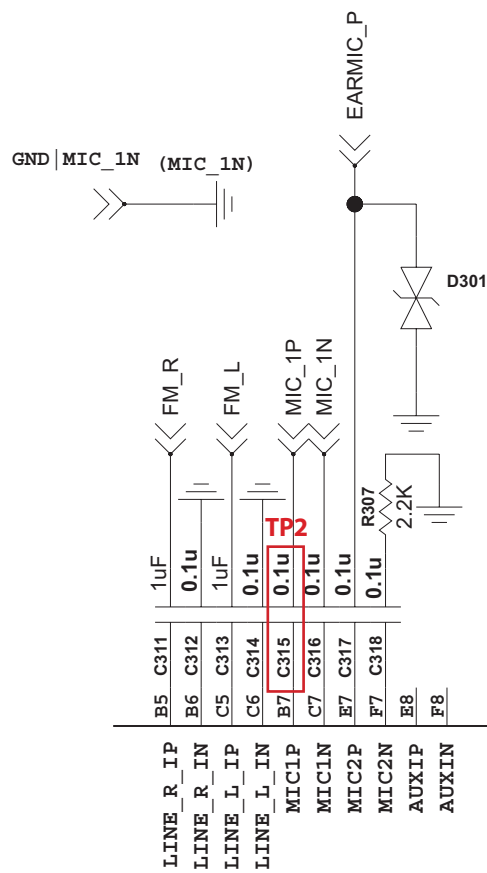


4.13.4. Microphone for Main MIC

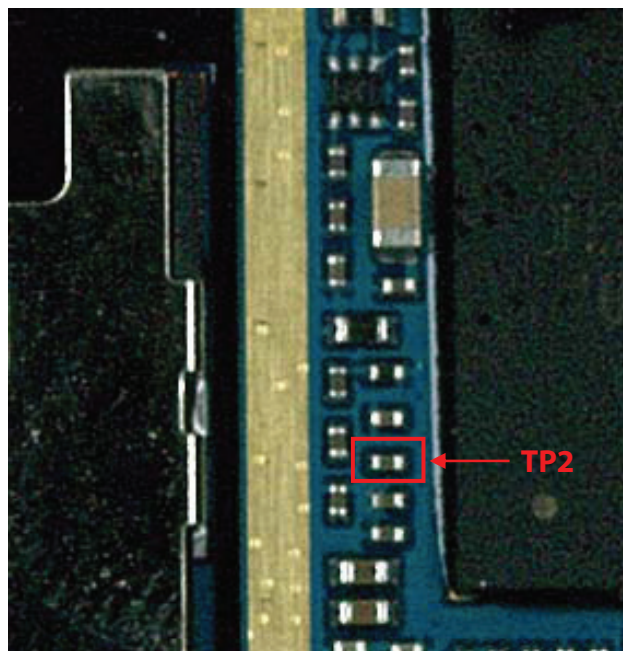
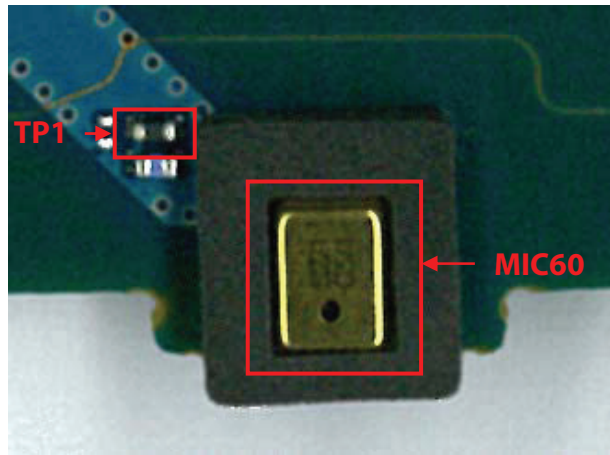
Main Microphone path as below:

MIC → TP1(FB600) → TP2(C315) → MSM7227





4. TROUBLE SHOOTING

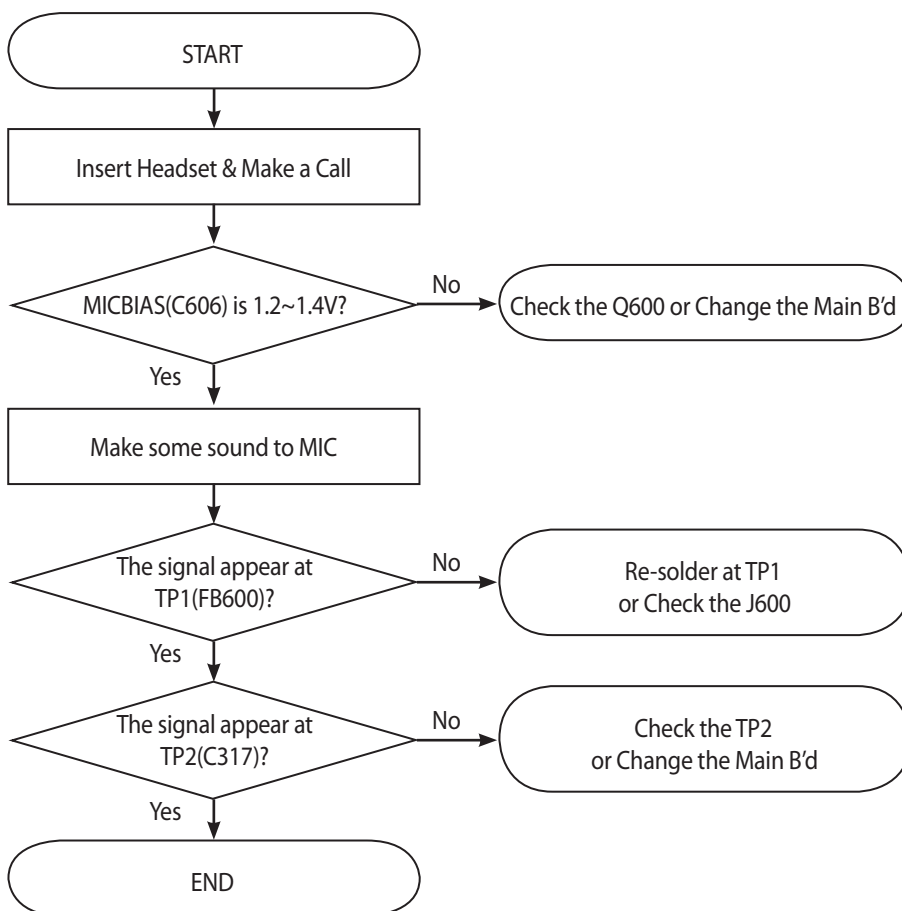


4.13.5. Microphone for headset

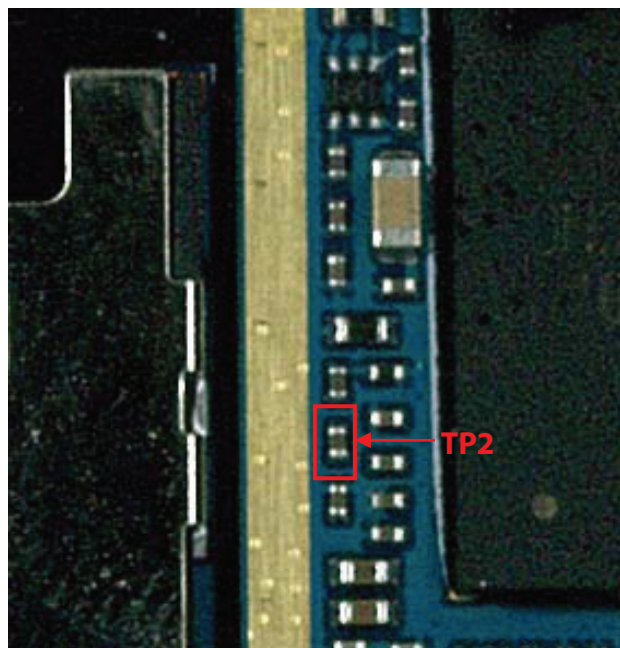
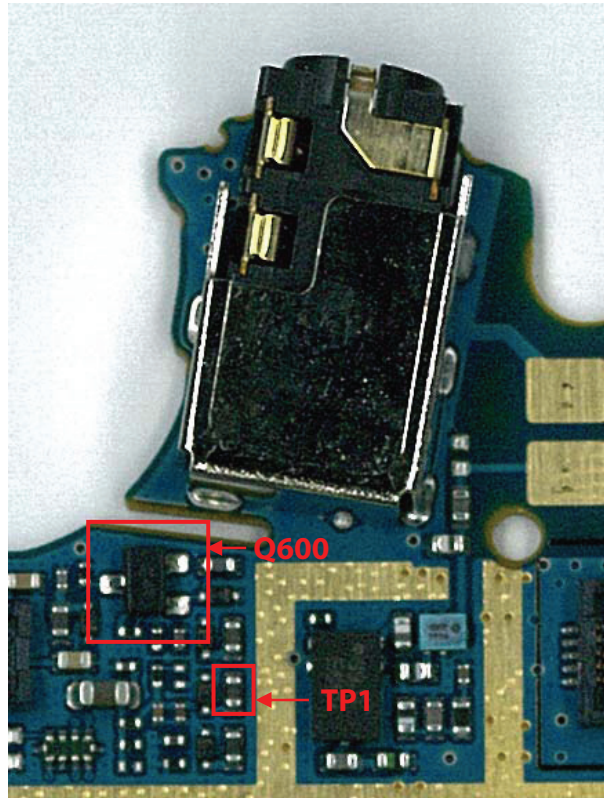
MIC for Headset path as below:

Insert Headset → Interrupt which are the signal of Headset detecting arise in EAR_SENSE

→ HS_MIC_BIAS:1.2~1.4V (MICBIAS) → MIC signal → TP1(FB605) → TP2(C317) → MSM7227

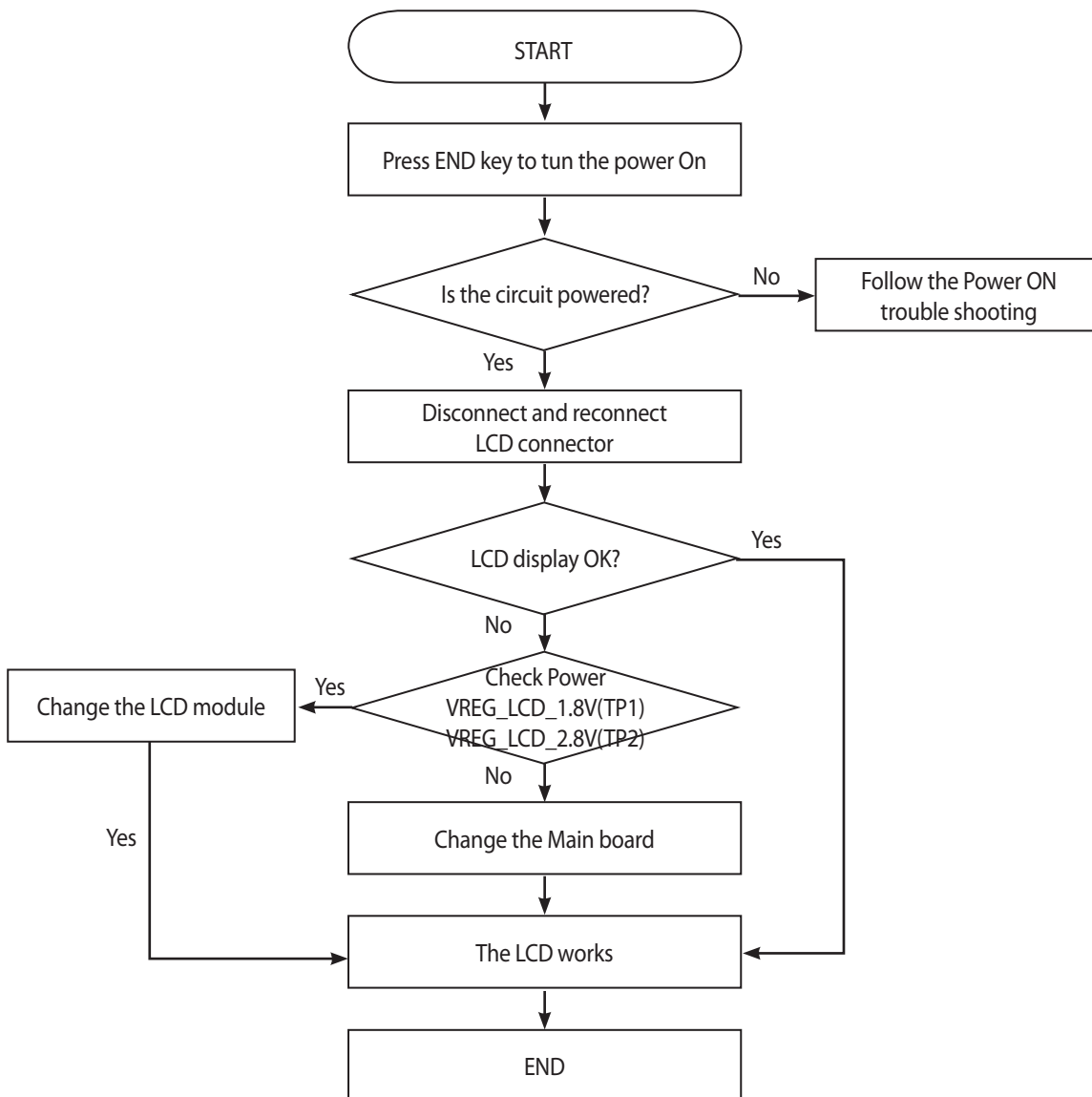


4. TROUBLE SHOOTING

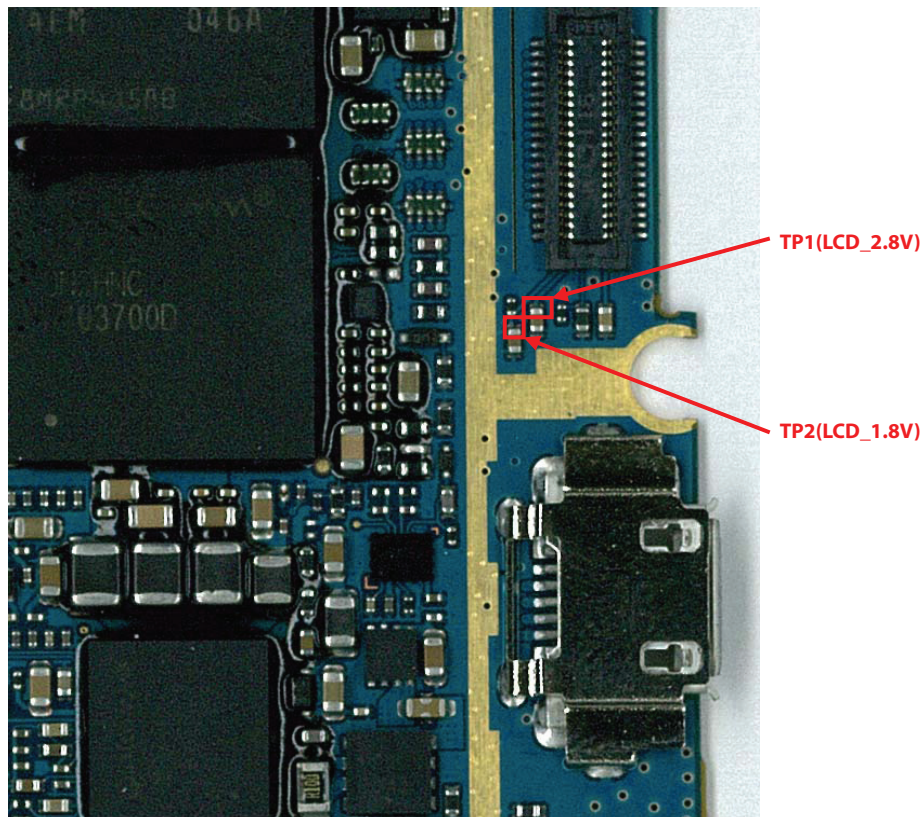
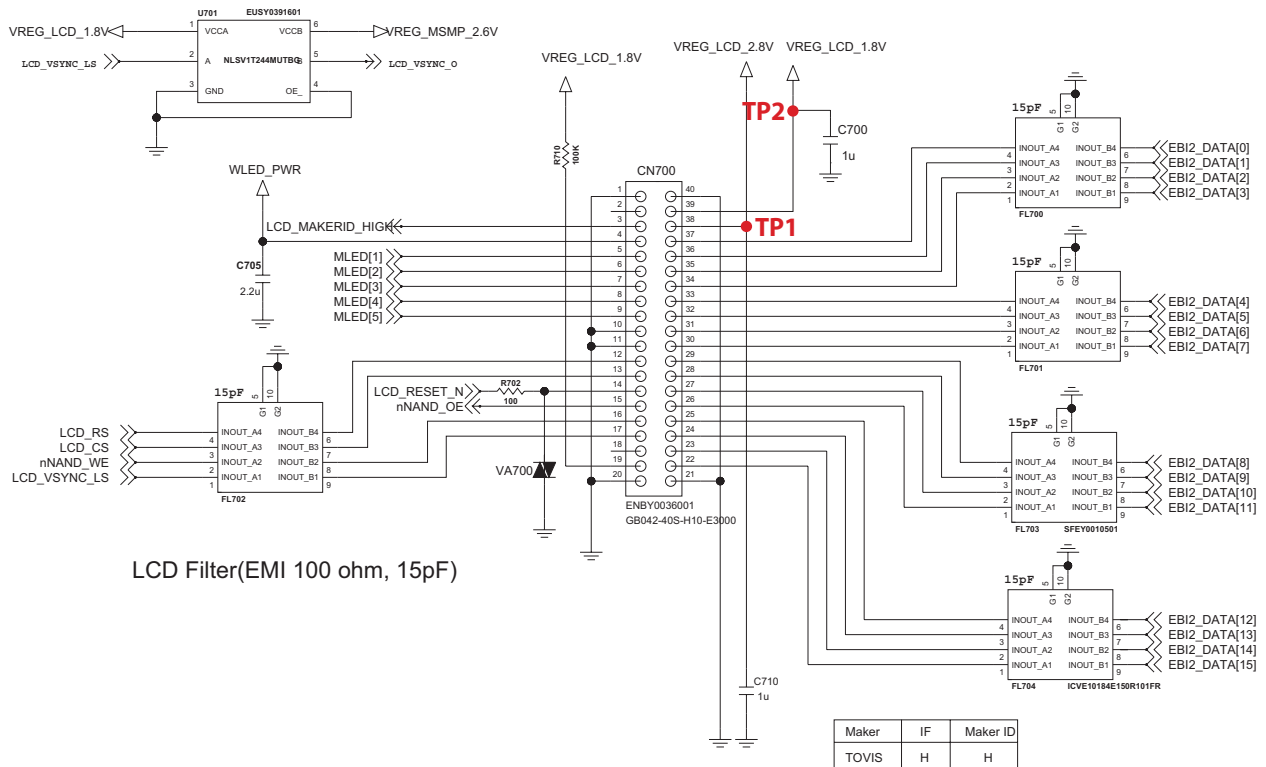


4.14 Main LCD trouble

Main LCD control signals are generated by MSM7227.
Those signal's path are : MSM7227 -> LCD Module



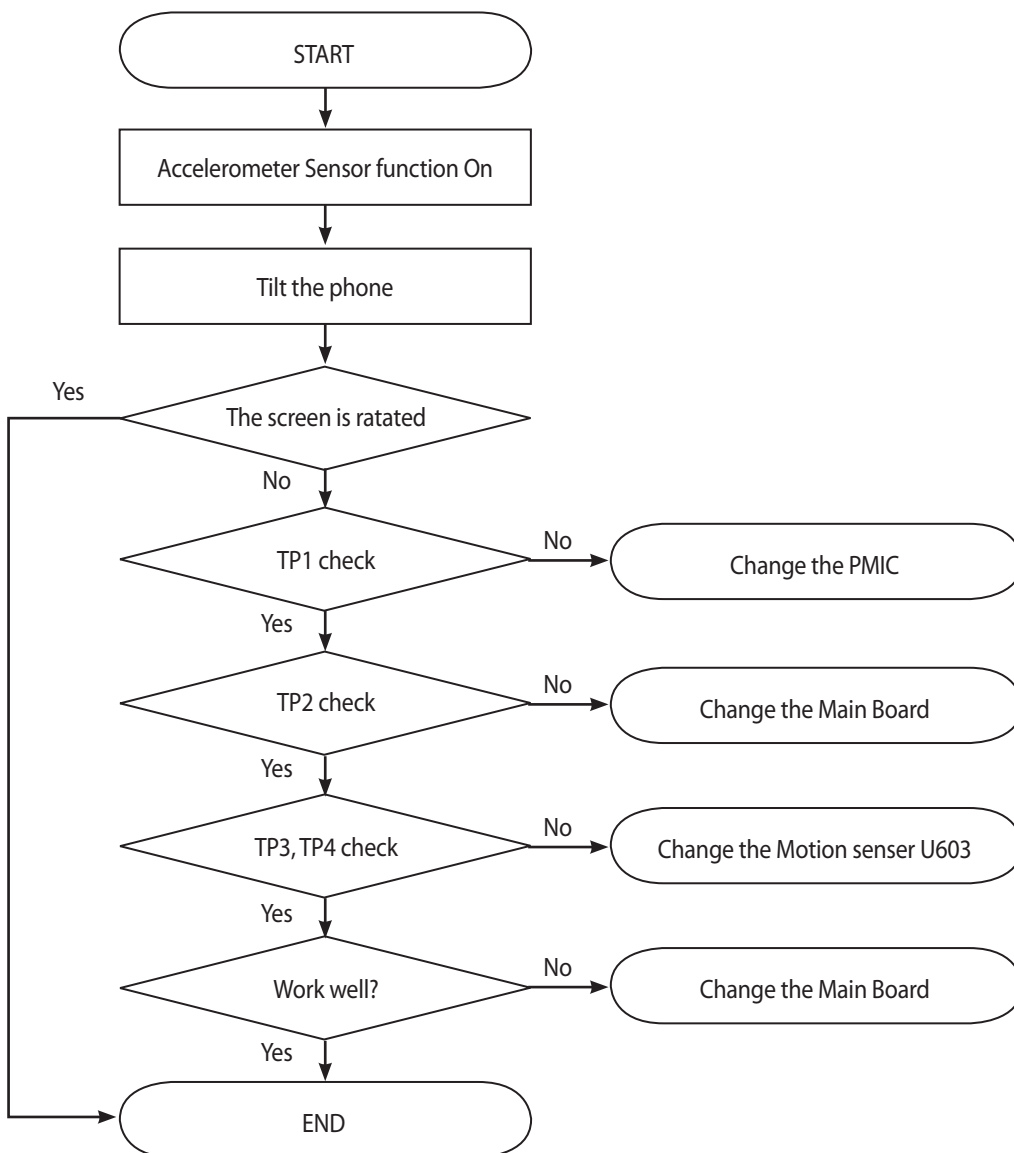
4. TROUBLE SHOOTING



4.15 Motion Sensor on/off trouble

Motion Sensor is worked as below :

Accelerometer Sensor function On → Tilt the phone (90°) → The screen is had rotated automatically.



Measurement

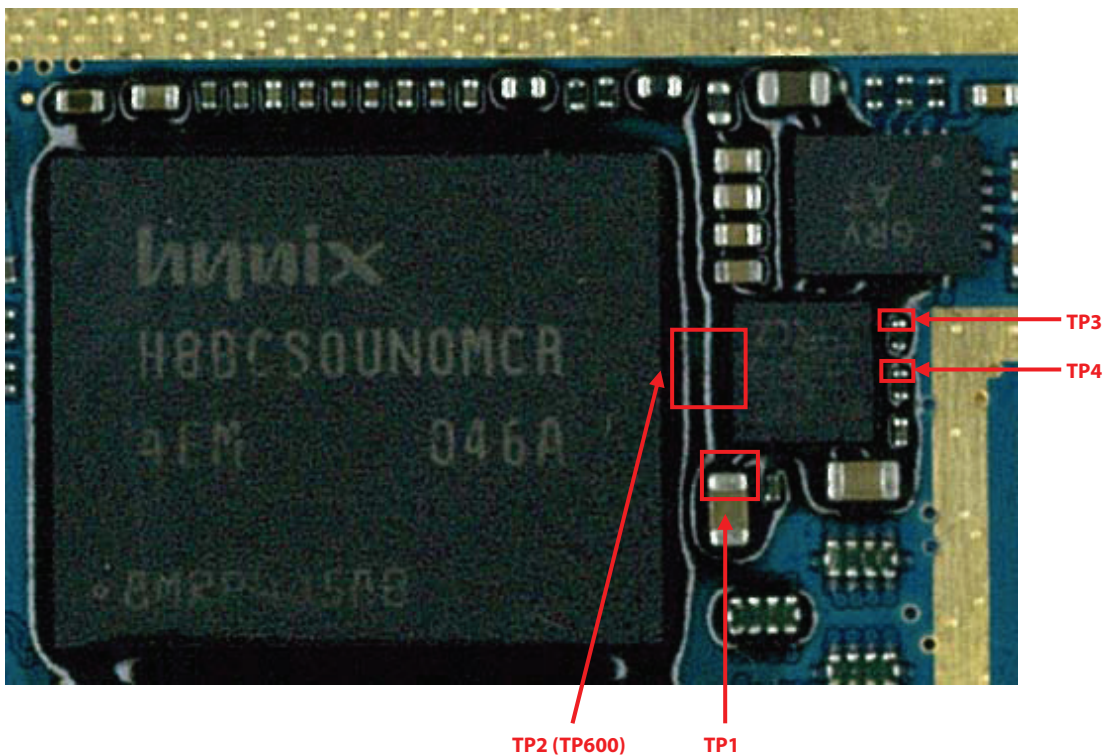
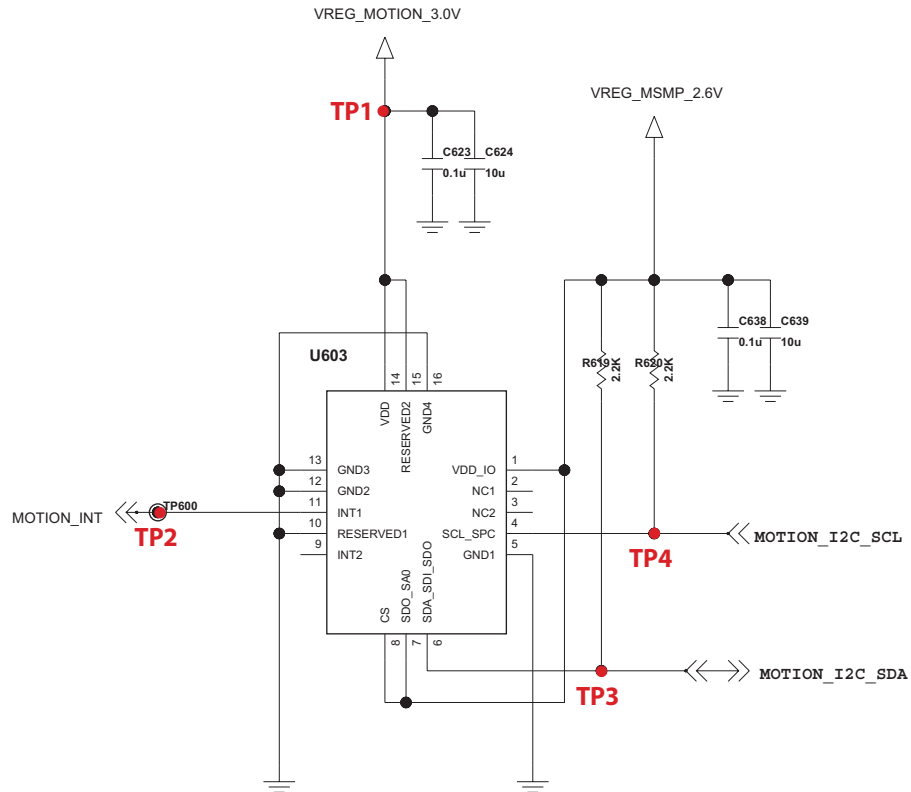
VREG_MOTION_3.0V(TP1)

MOTION_INT(TP2)

MOTION_I2C_SDA(TP3)

MOTION_I2C_SCL(TP4)

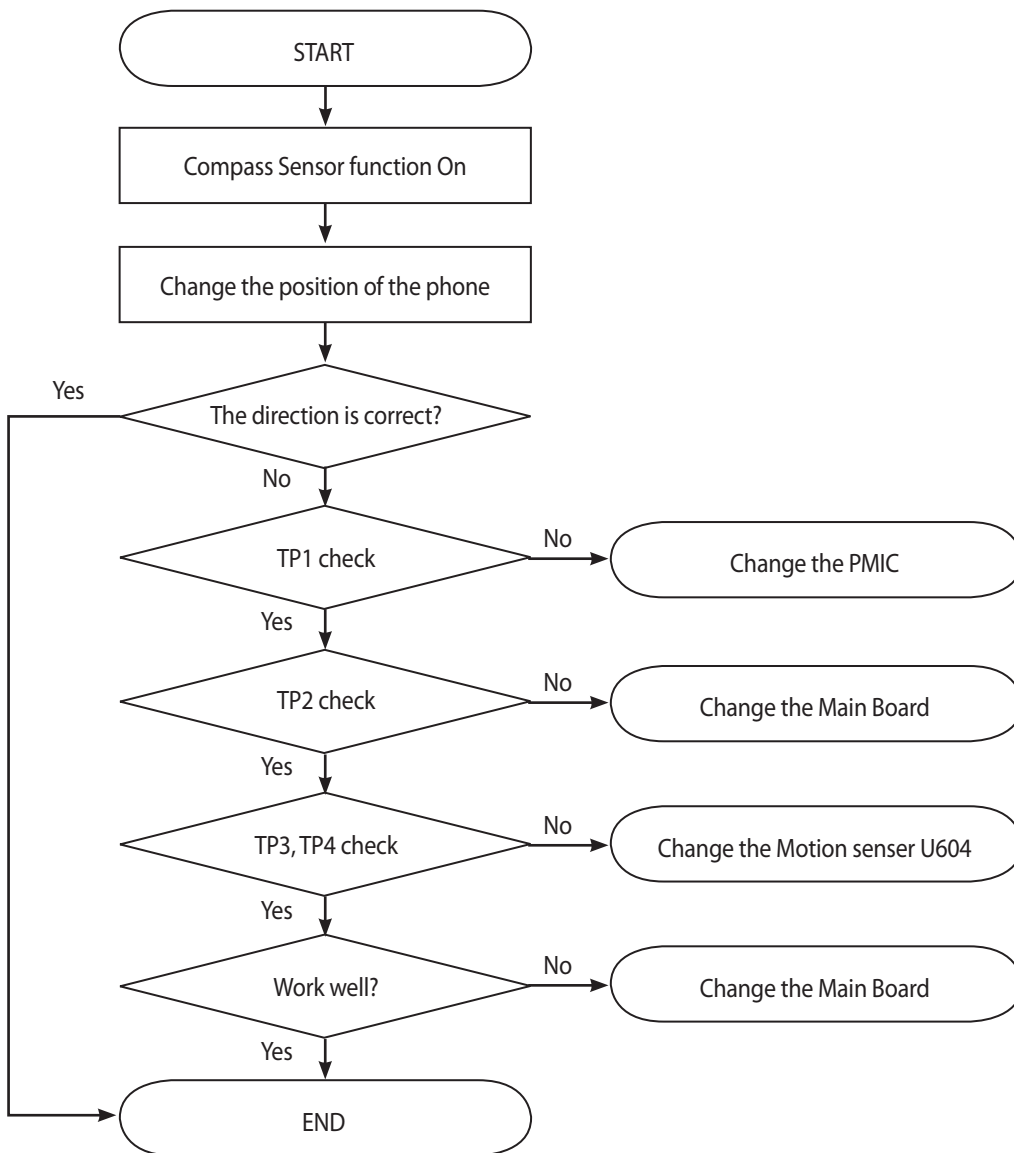
4. TROUBLE SHOOTING



4.16 Compass Sensor on/off trouble

Compass Sensor is worked as below :

Compass Sensor function On



Measurement

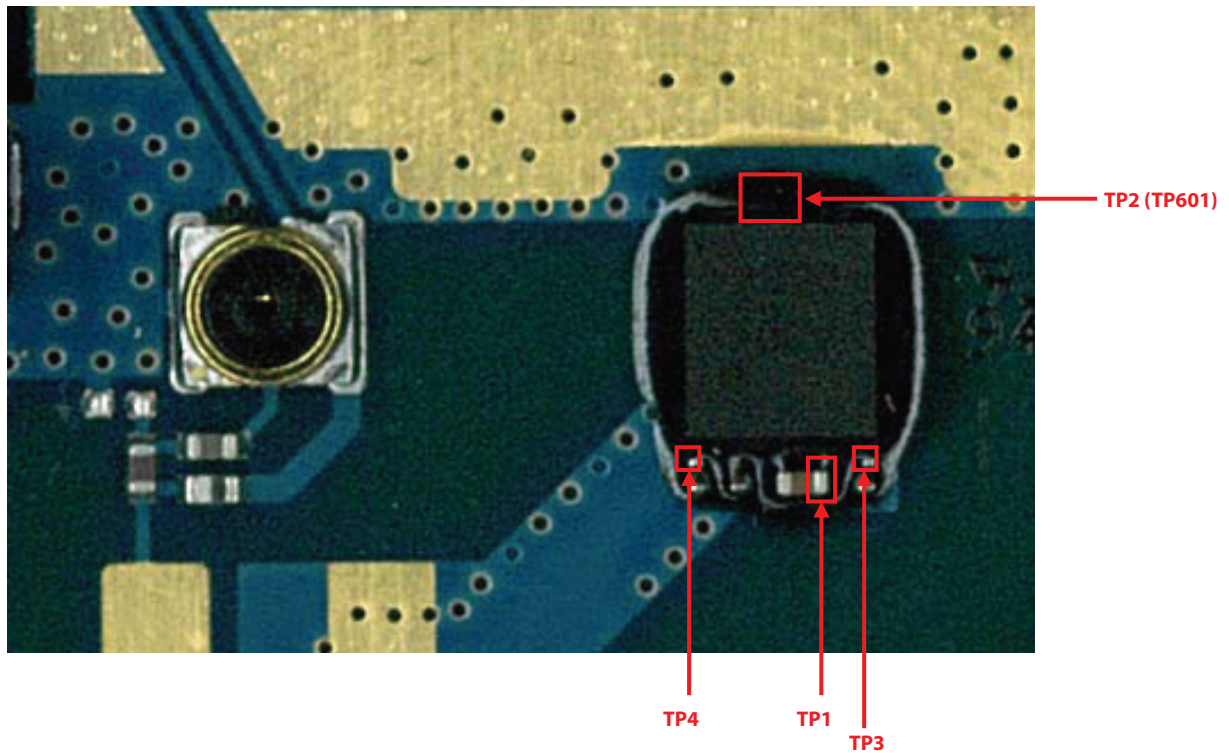
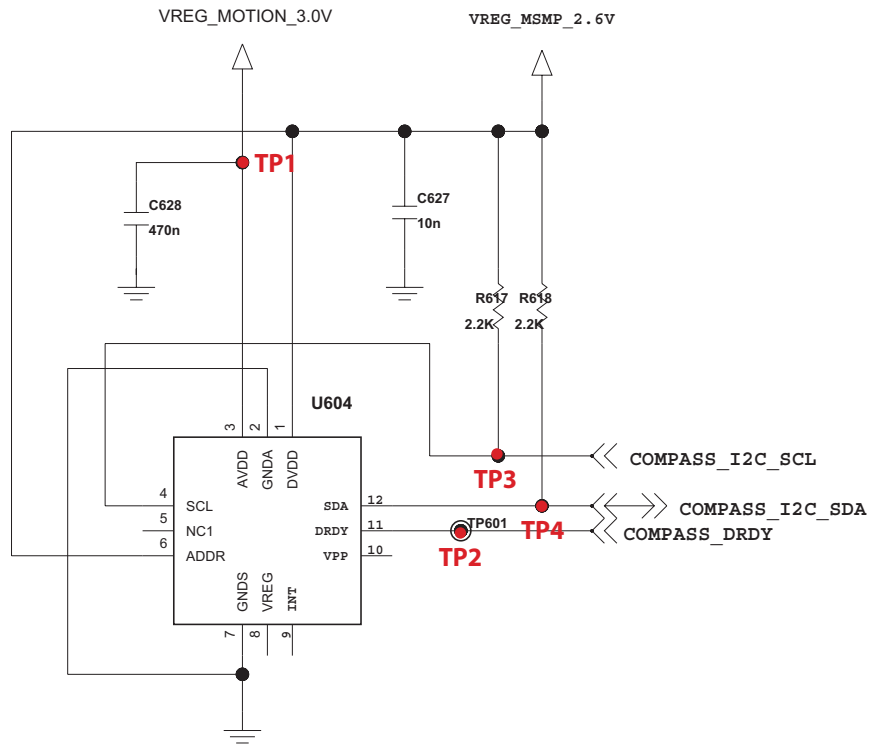
VREG_MOTION_3.0V(TP1)

COMPASS_DRDY(TP2)

PROX_COMPASS_I2C_SCL(TP3)

PROX_COMPASS_I2C_SDA(TP4)

4. TROUBLE SHOOTING

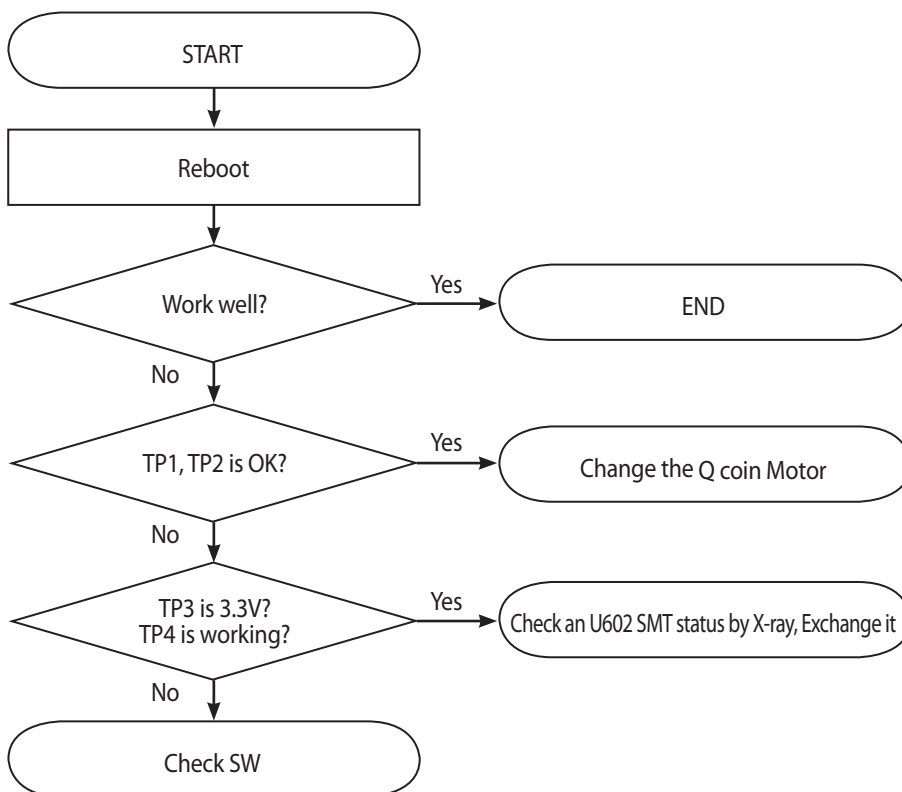


4.17 Q coin Motor

Q coin Motor is worked as below :

touch touch-window → Vibration feedback

U601 : Used the PWM pulse



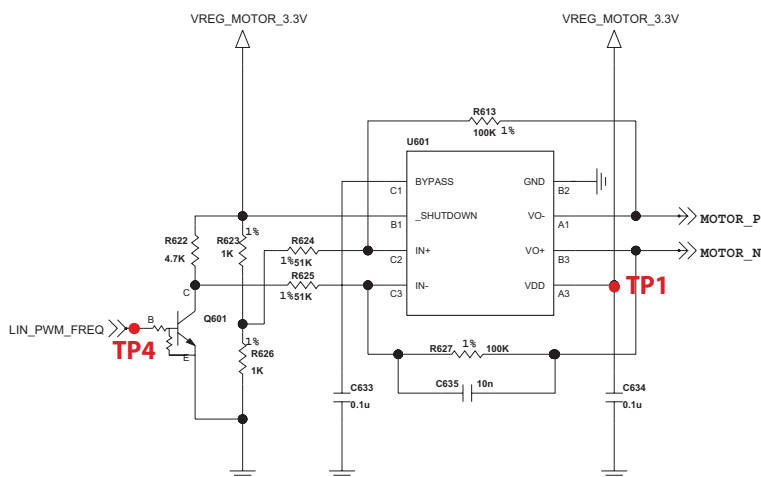
Measurement

VREG_MOTOR_3.3V(TP1)

MOTOR_P(TP2) / MOTOR_N(TP3)

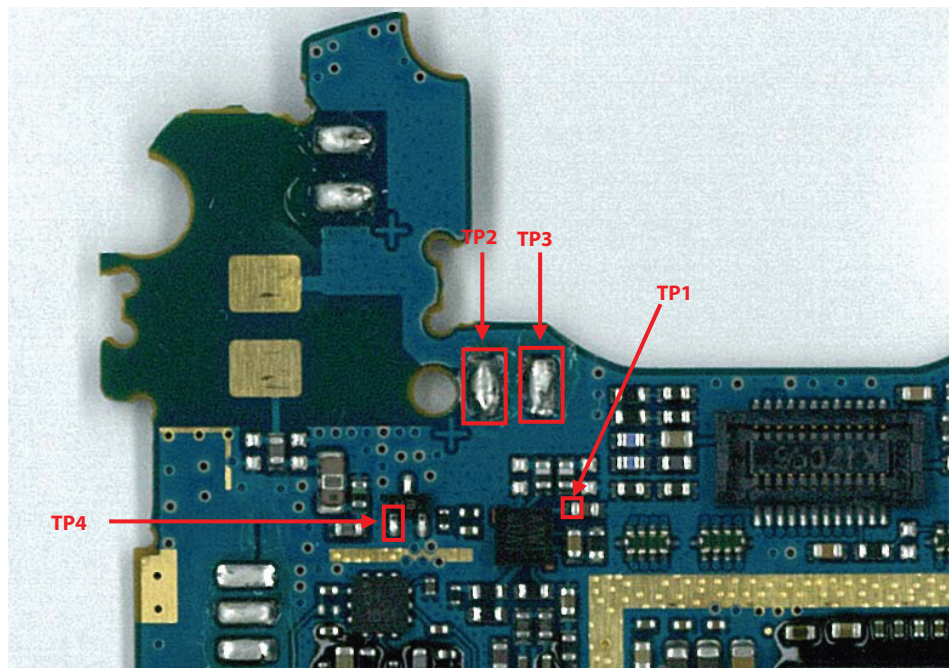
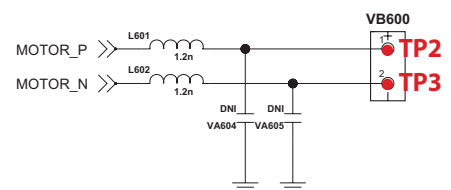
LIN_PWM_FREQ(TP4)

Q-coin MOTOR

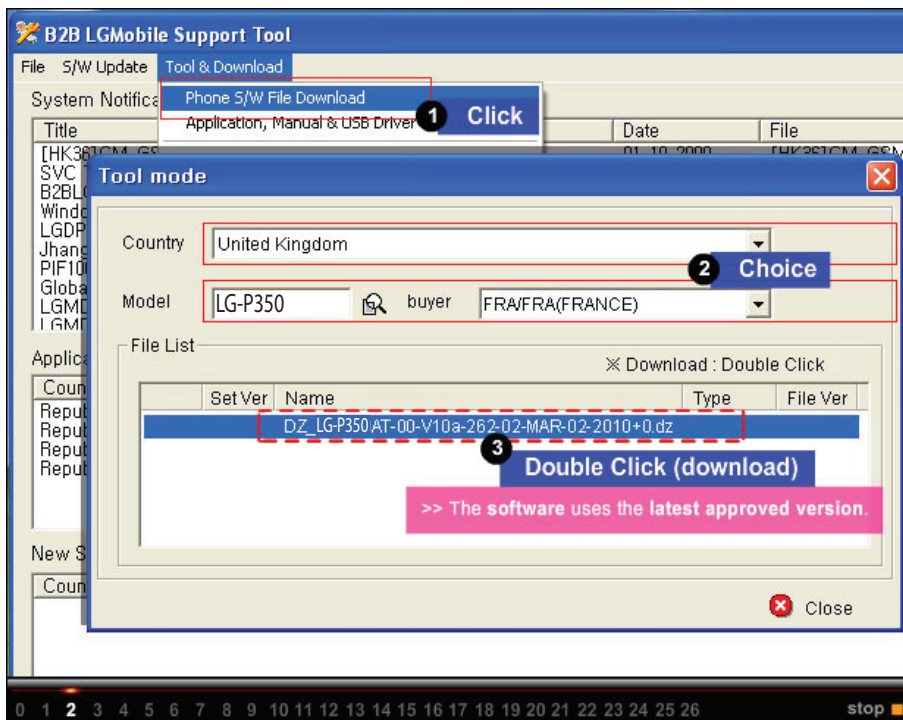
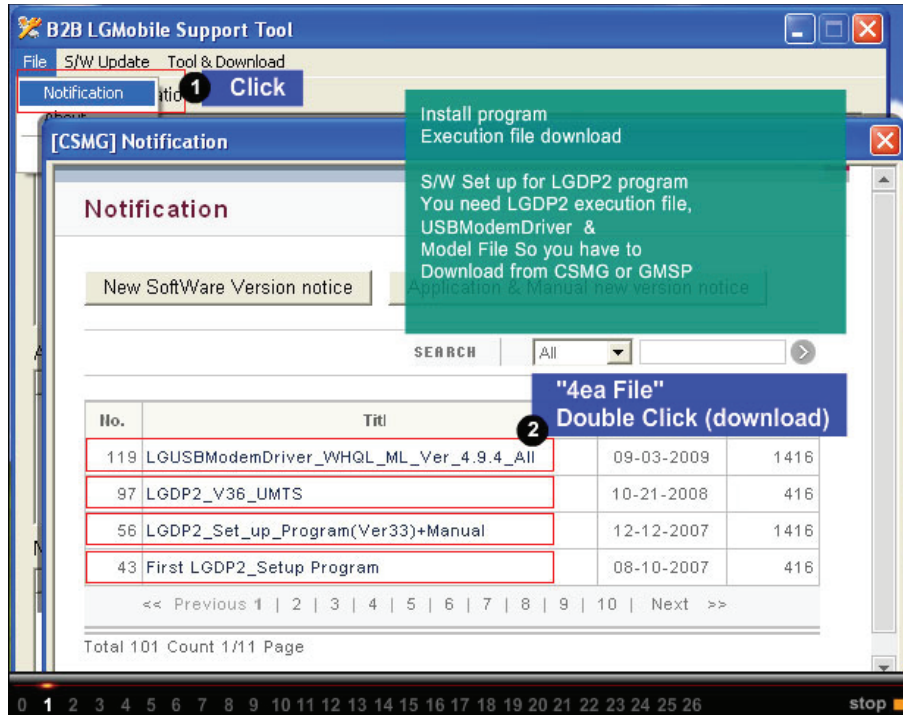


MOTOR

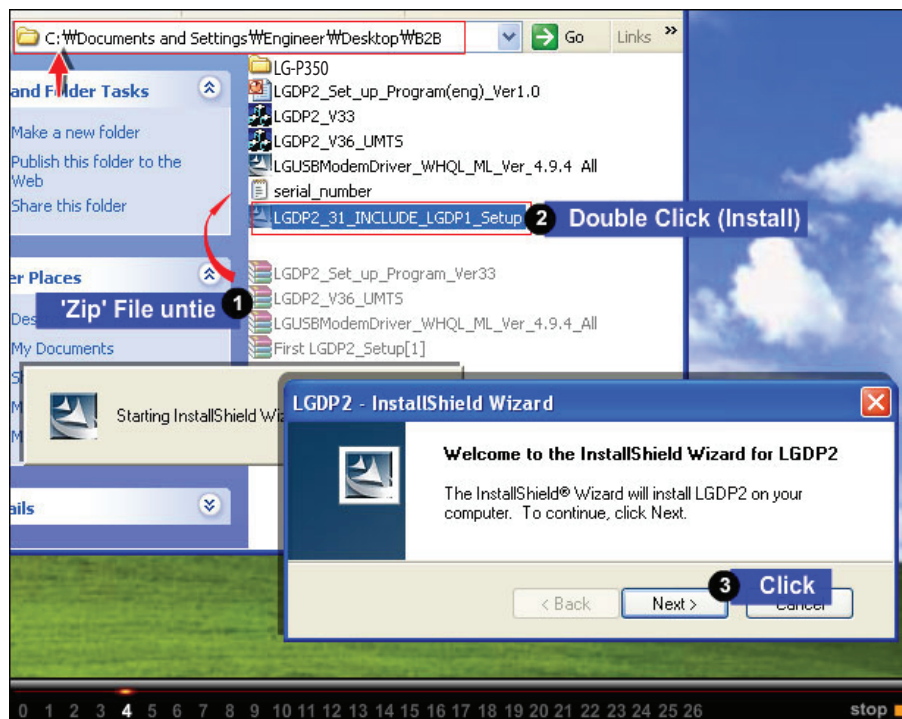
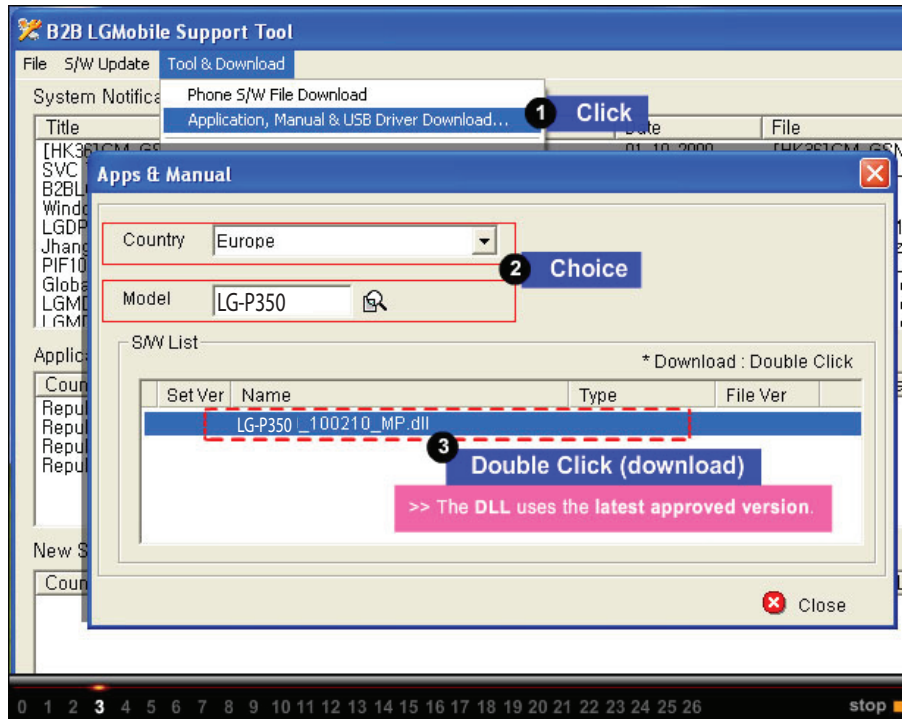
(Q-Coin)

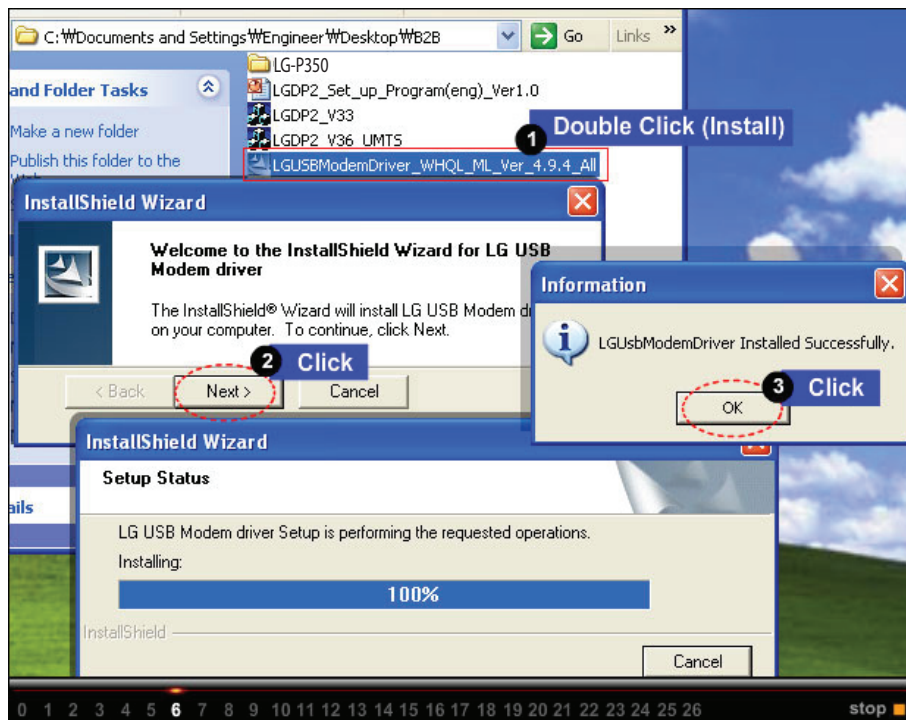
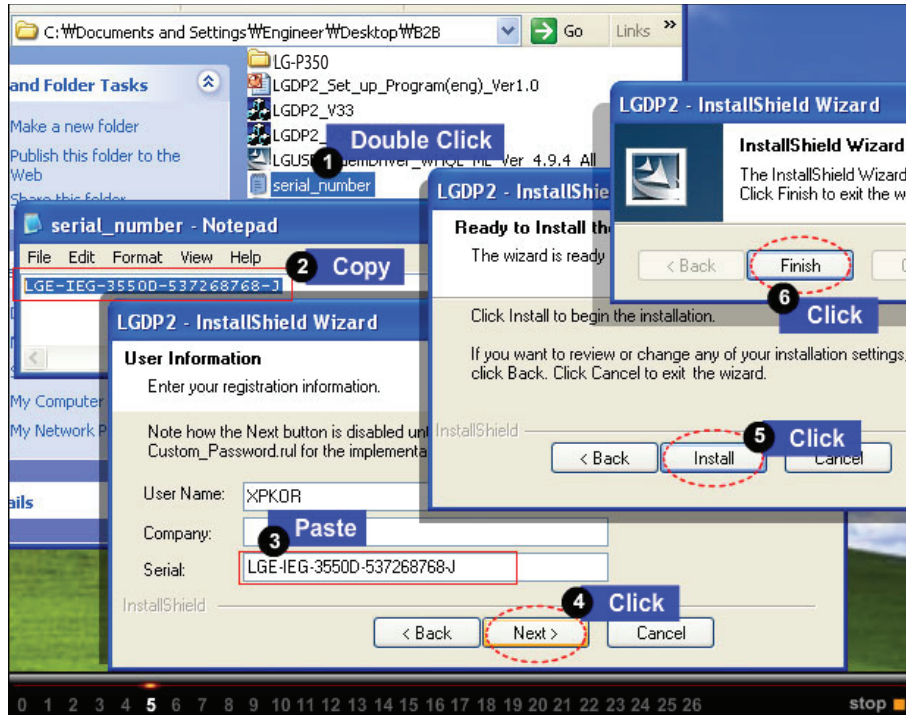


5. DOWNLOAD

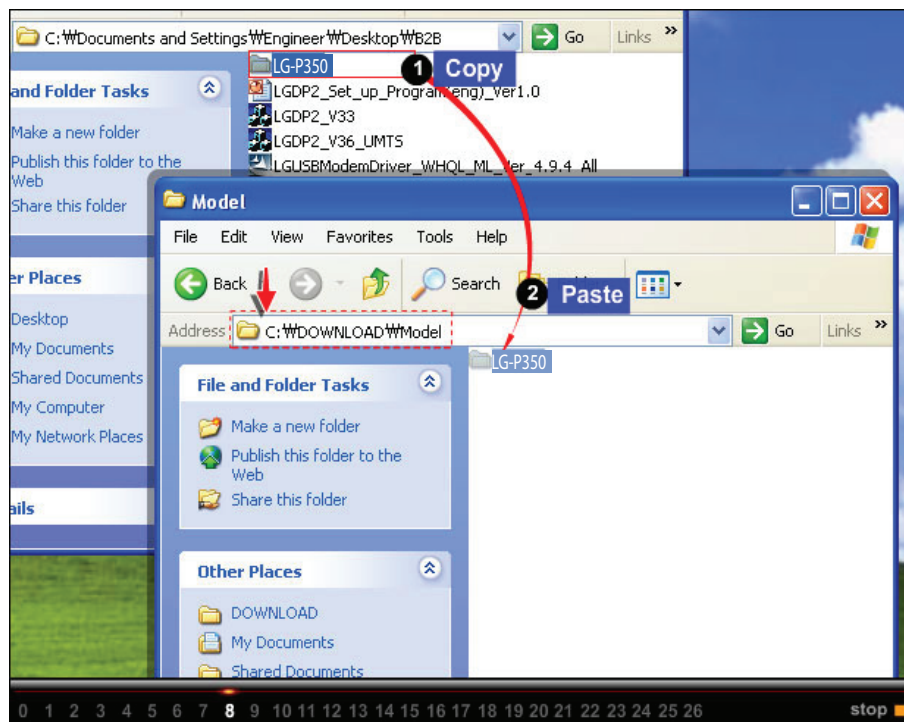
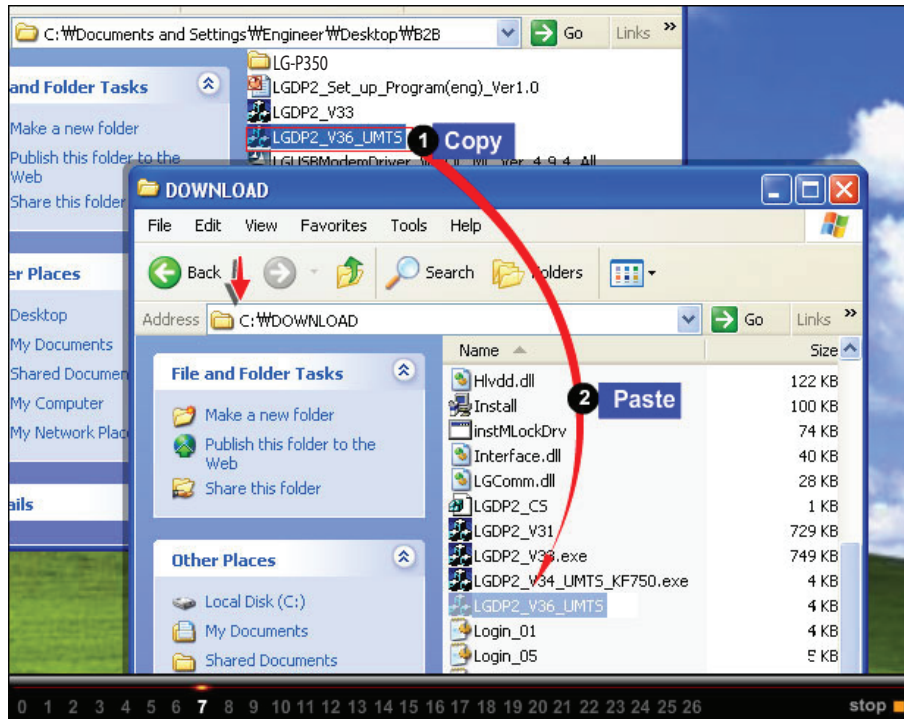


5. DOWNLOAD

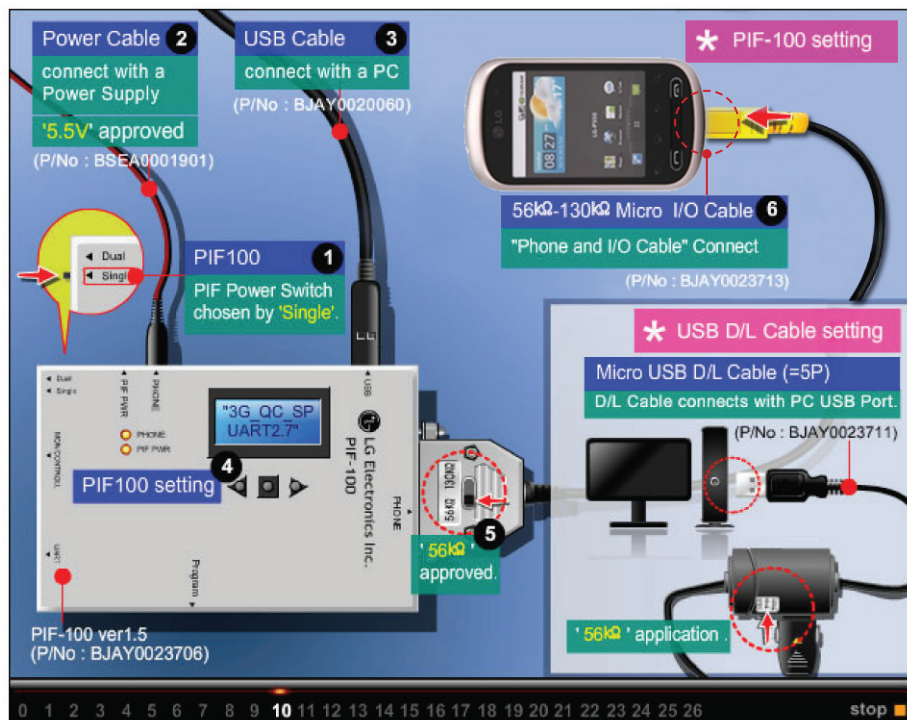
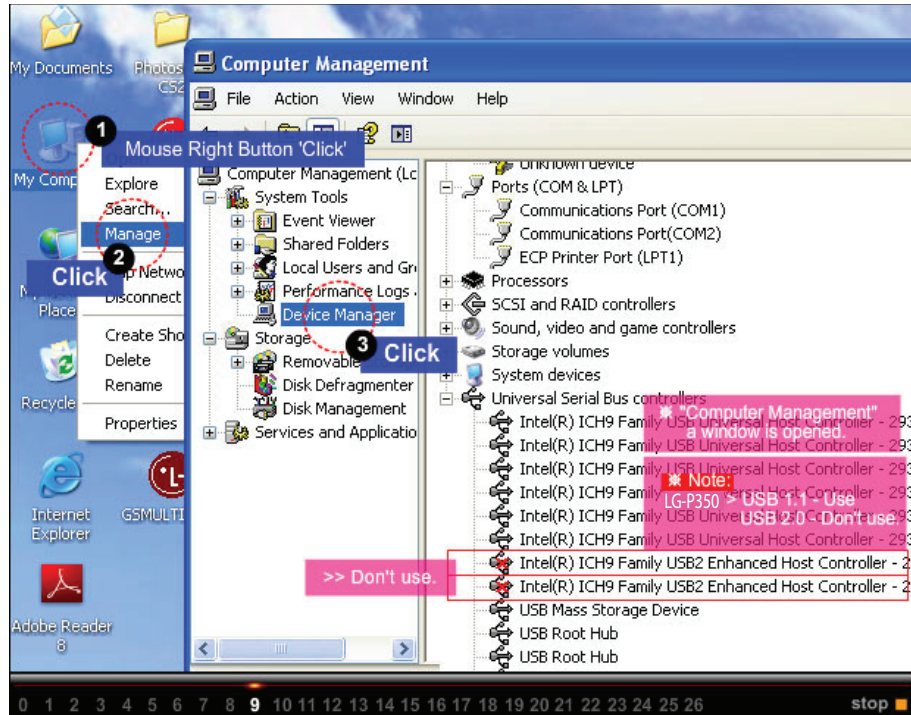


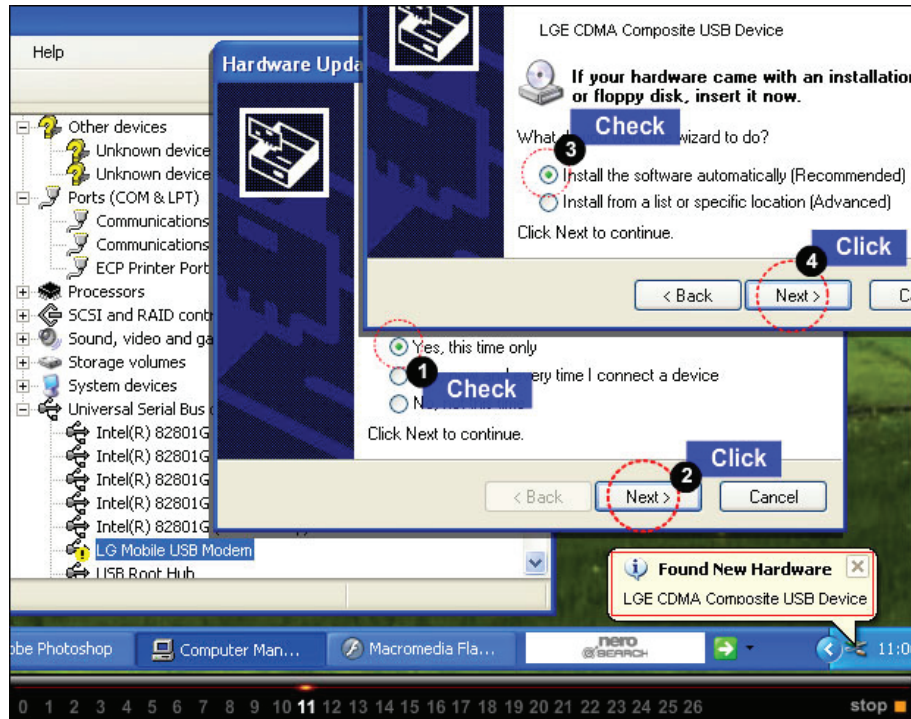


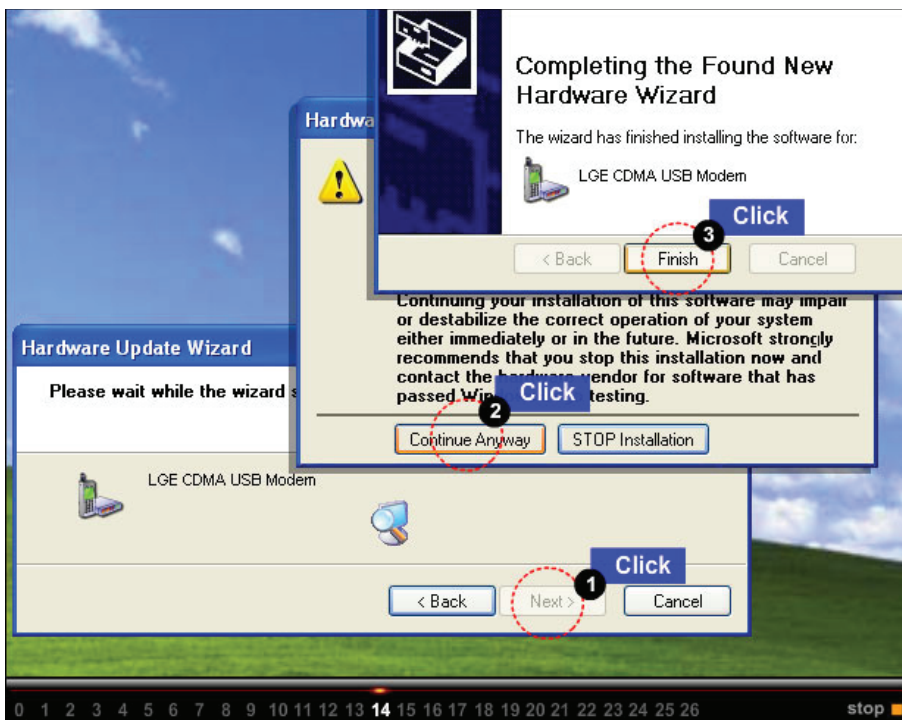
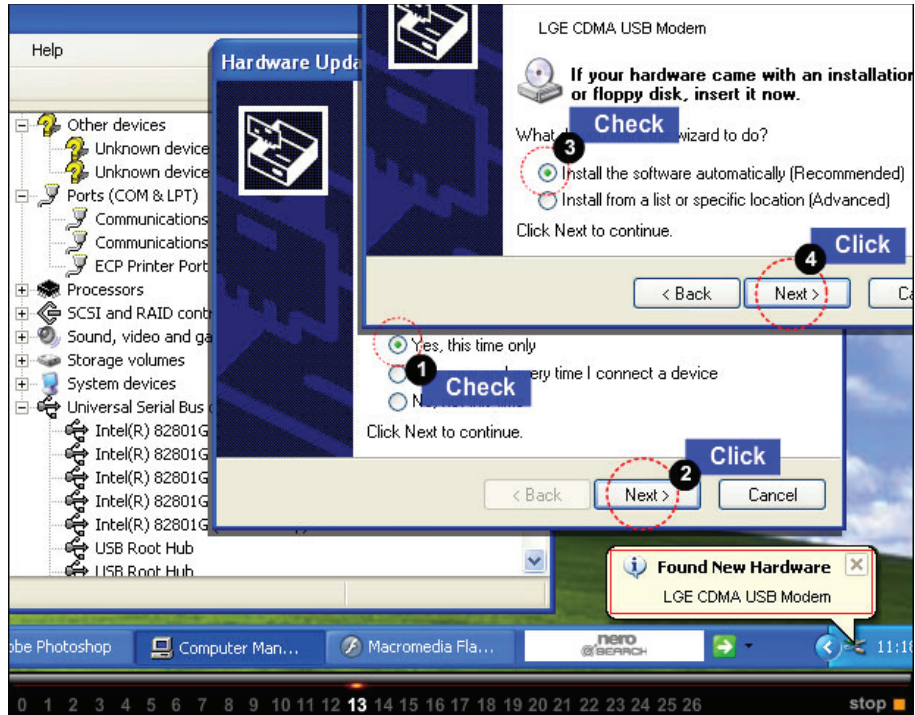
5. DOWNLOAD

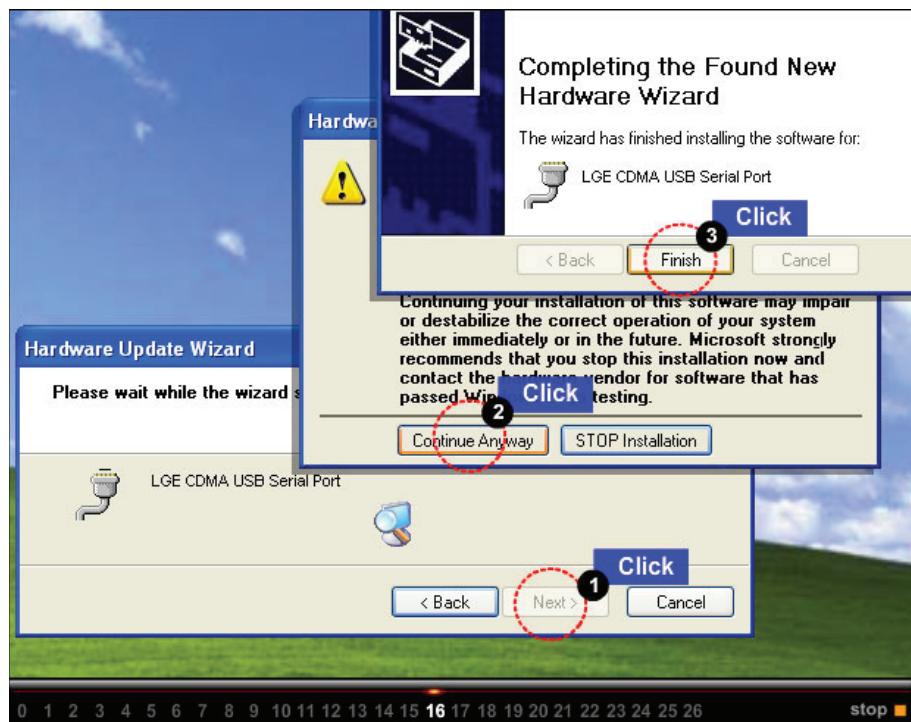
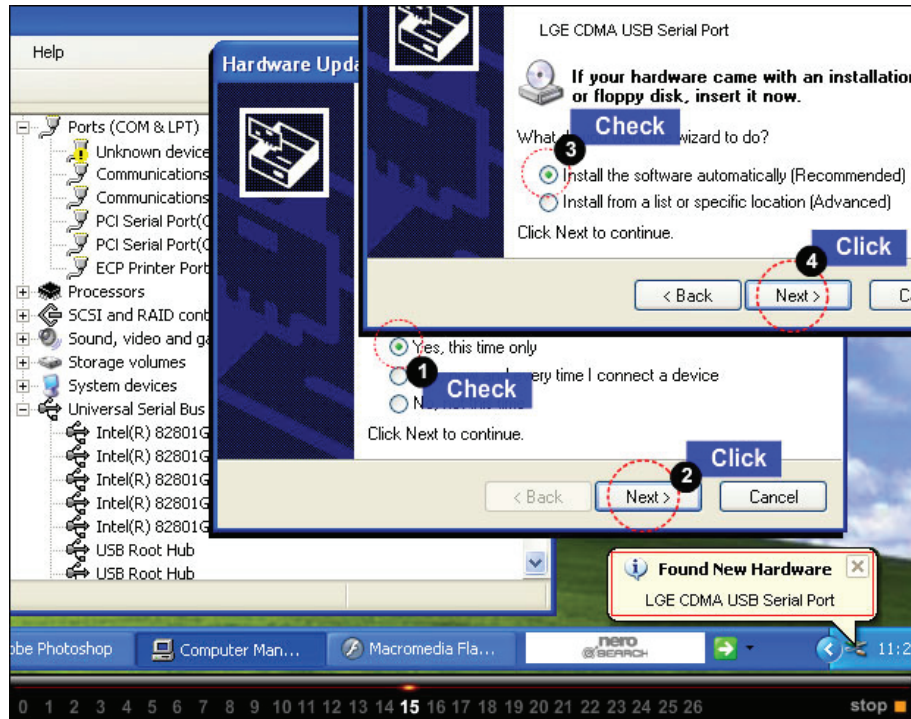


5. DOWNLOAD

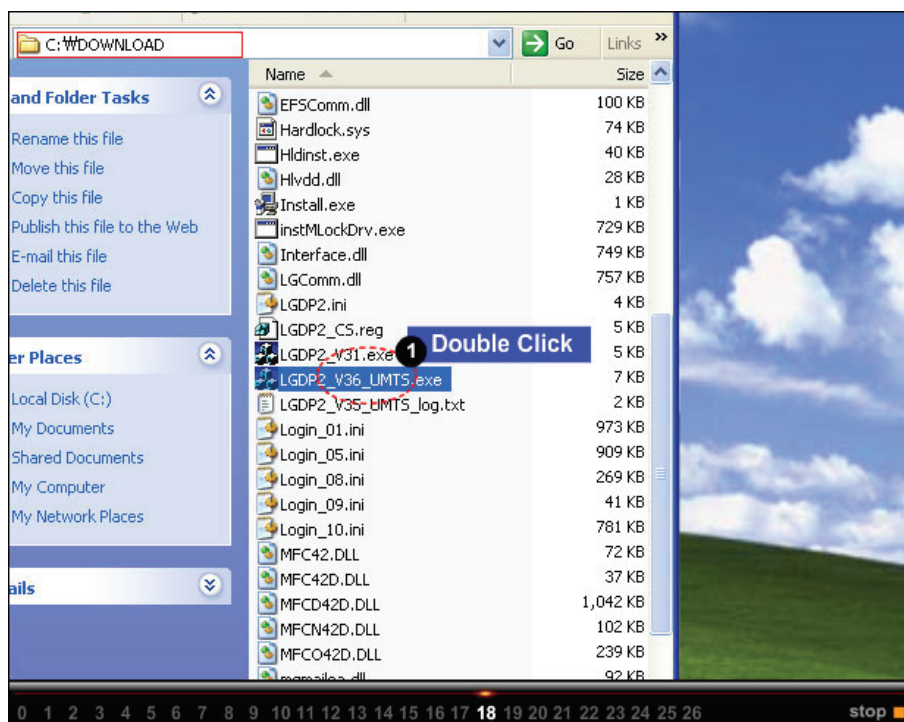
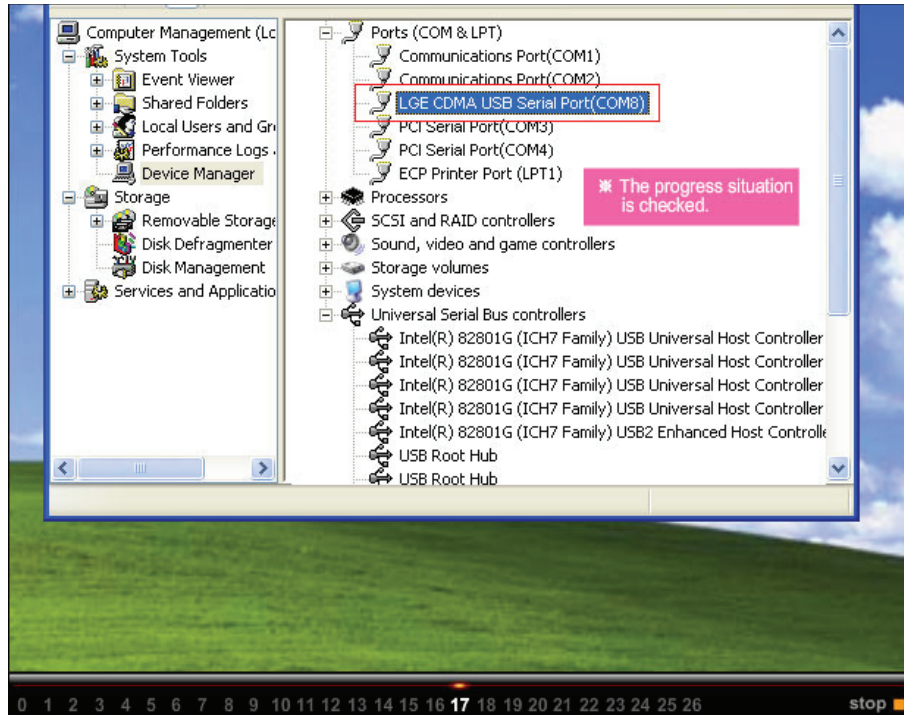




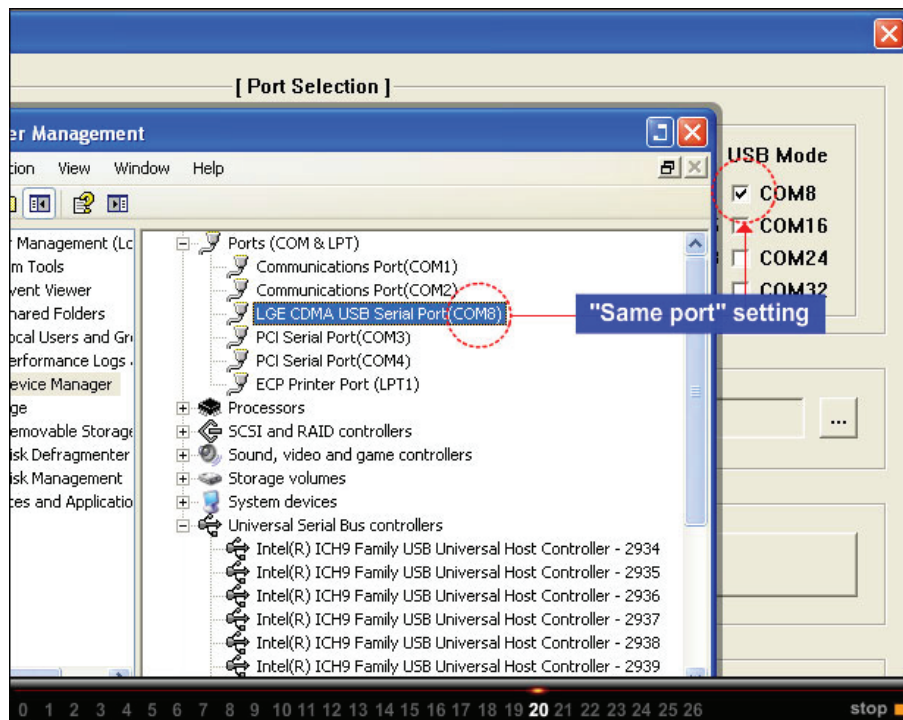
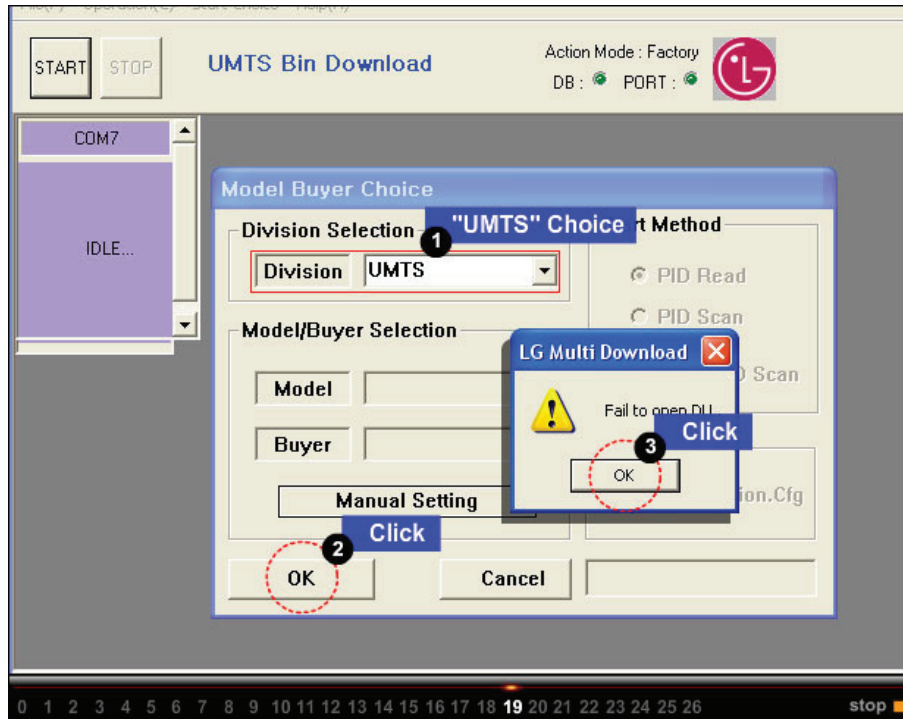




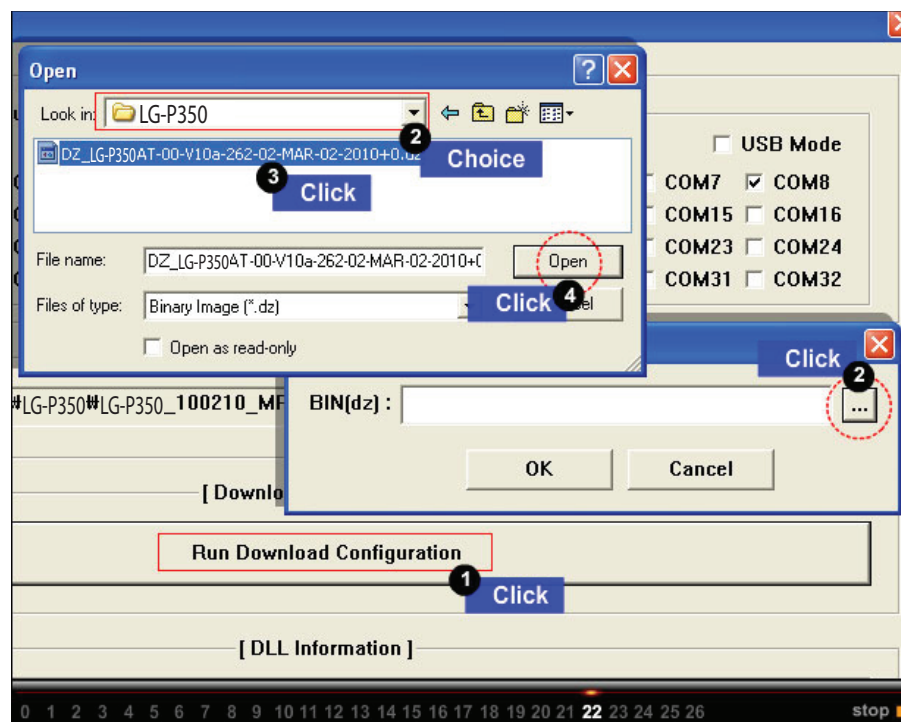
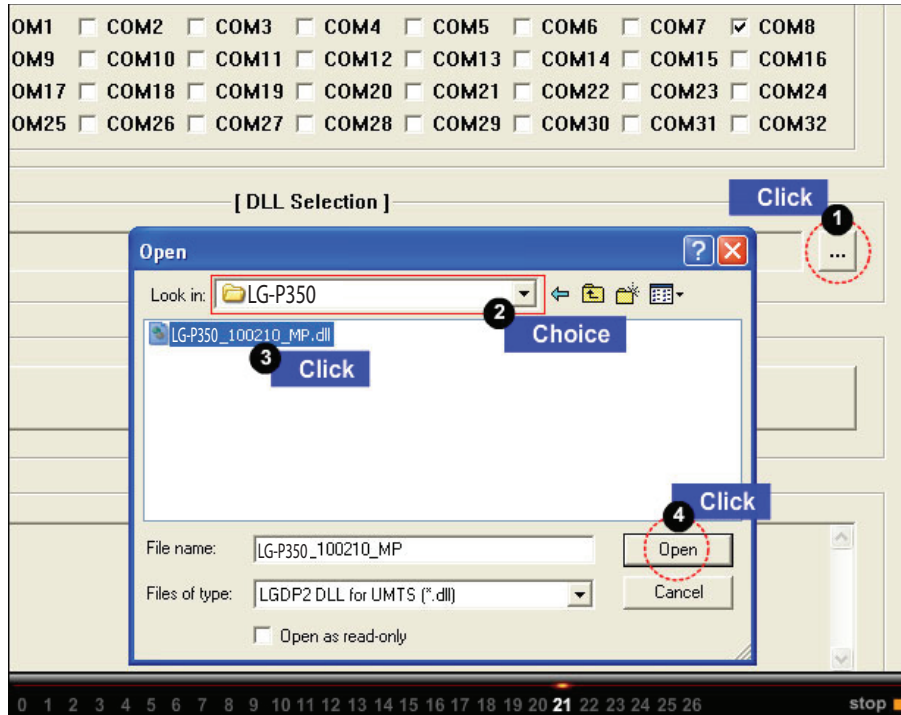
5. DOWNLOAD



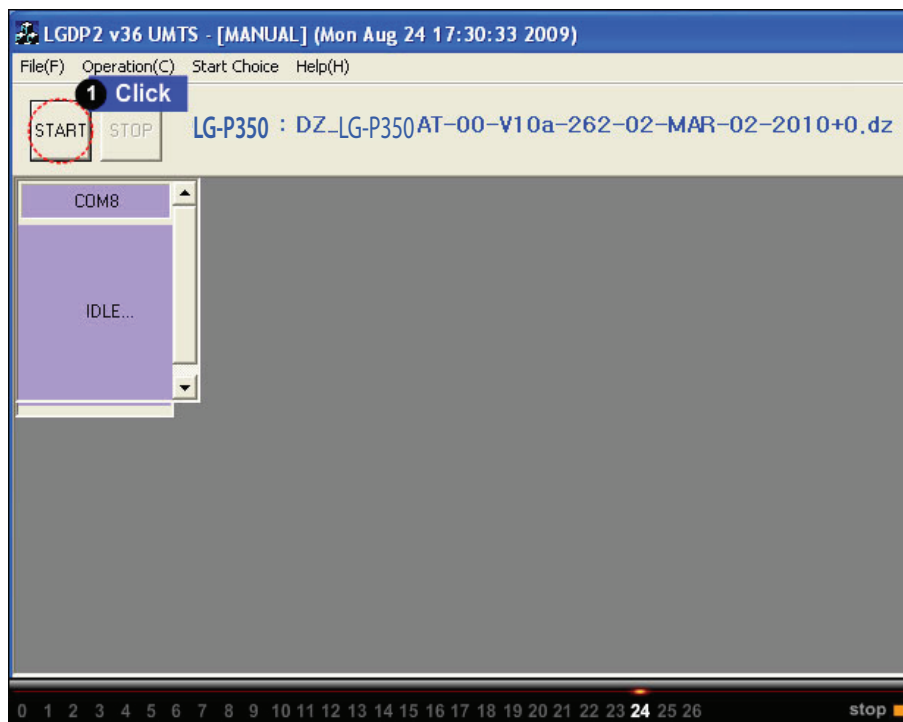
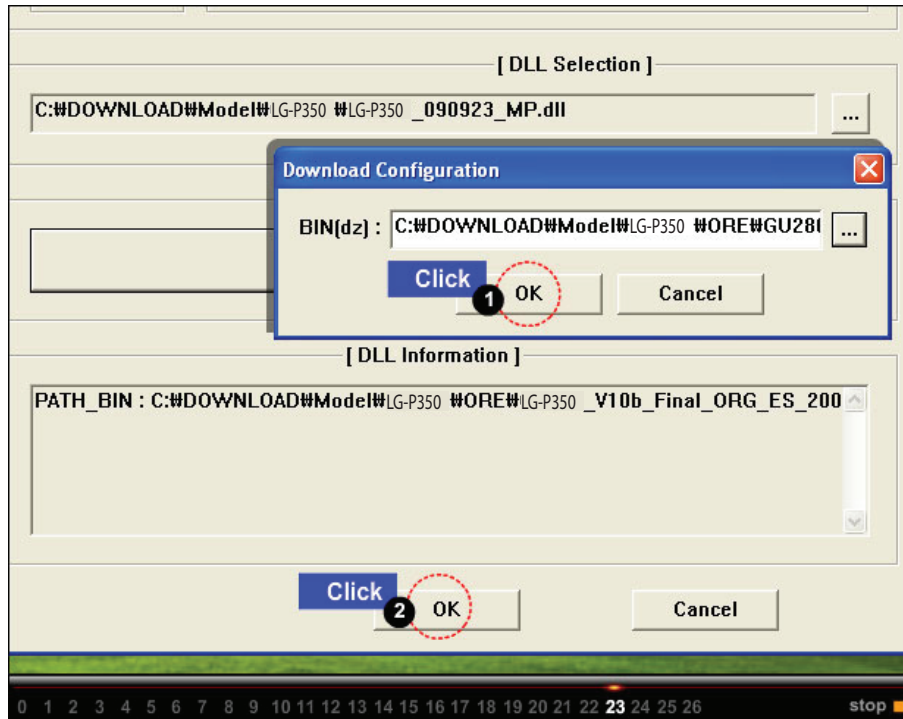
5. DOWNLOAD



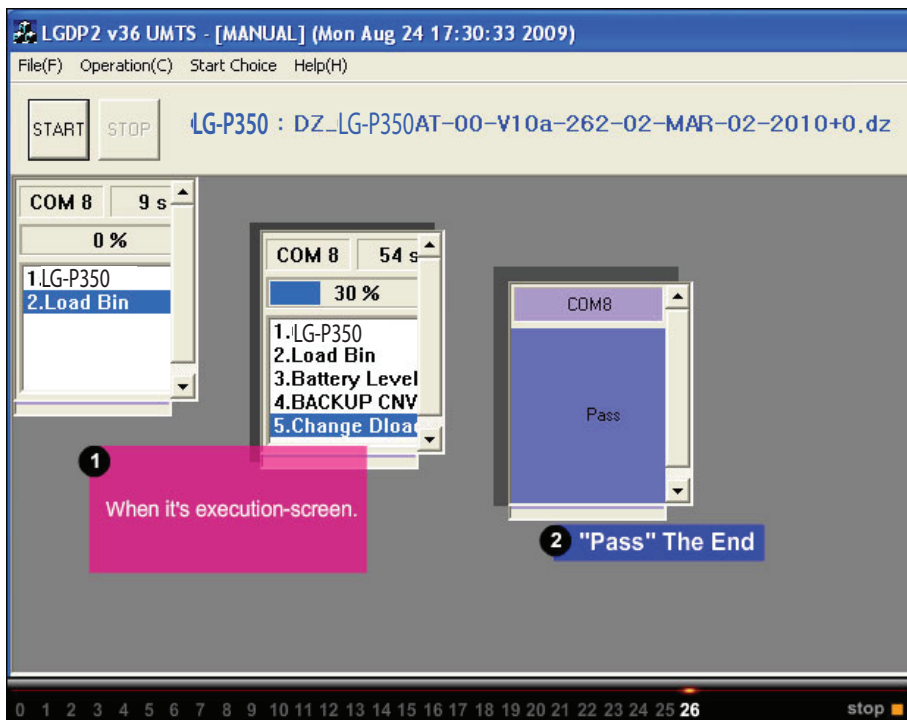
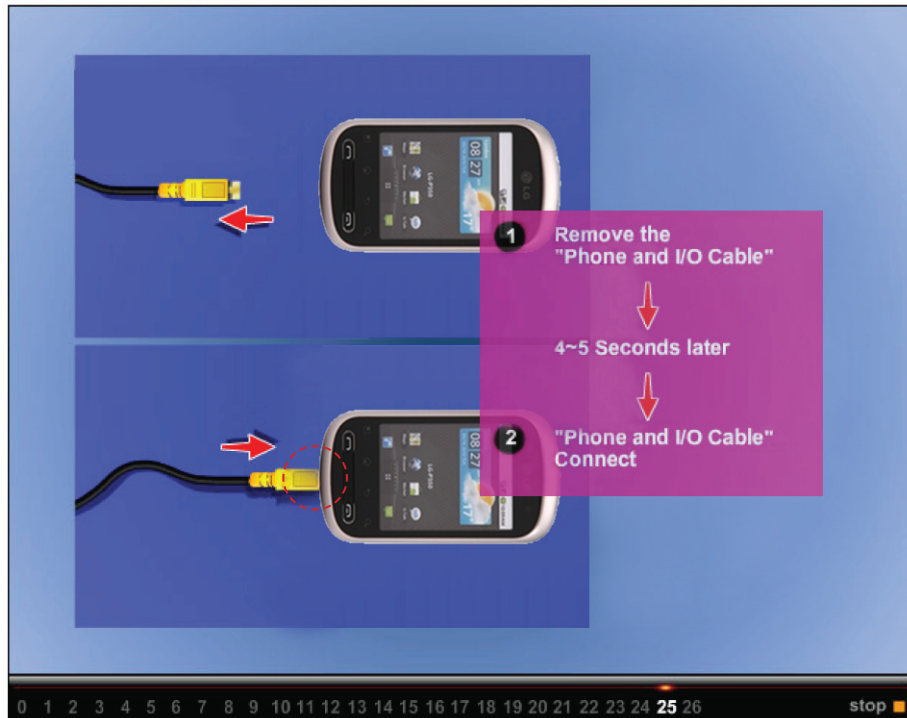
5. DOWNLOAD



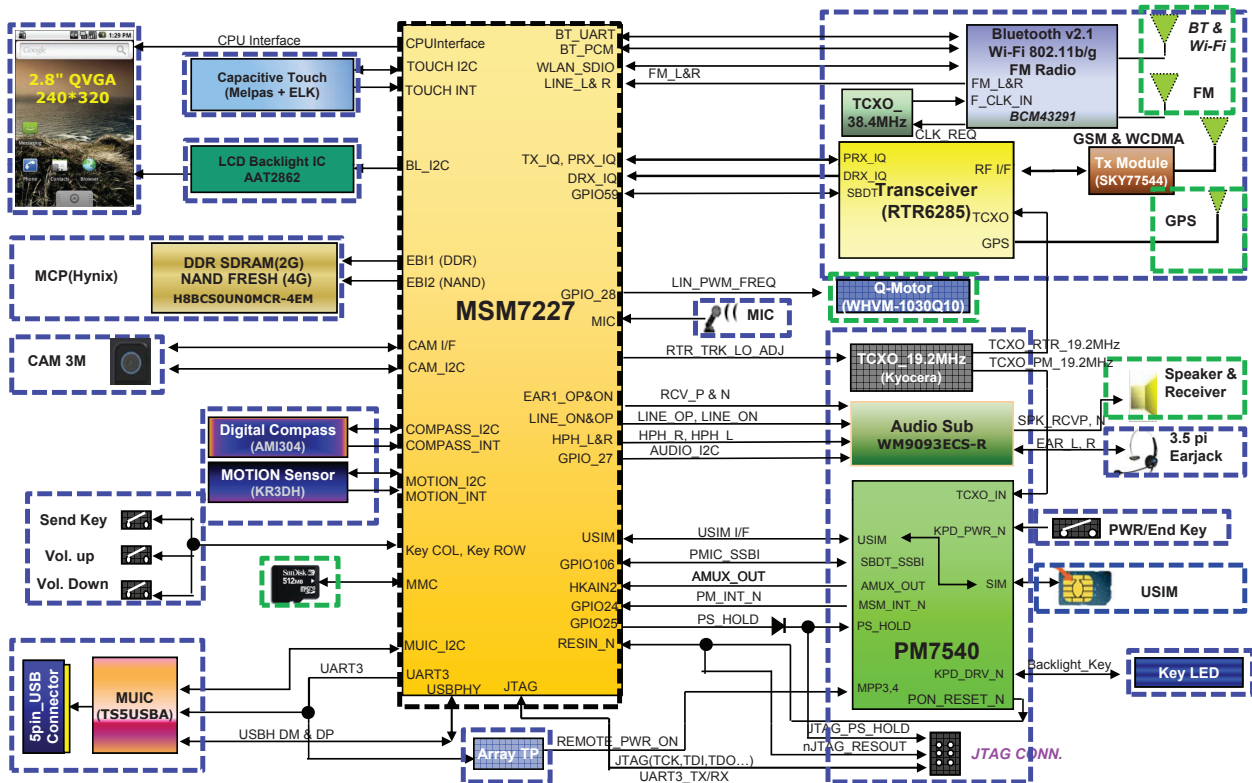
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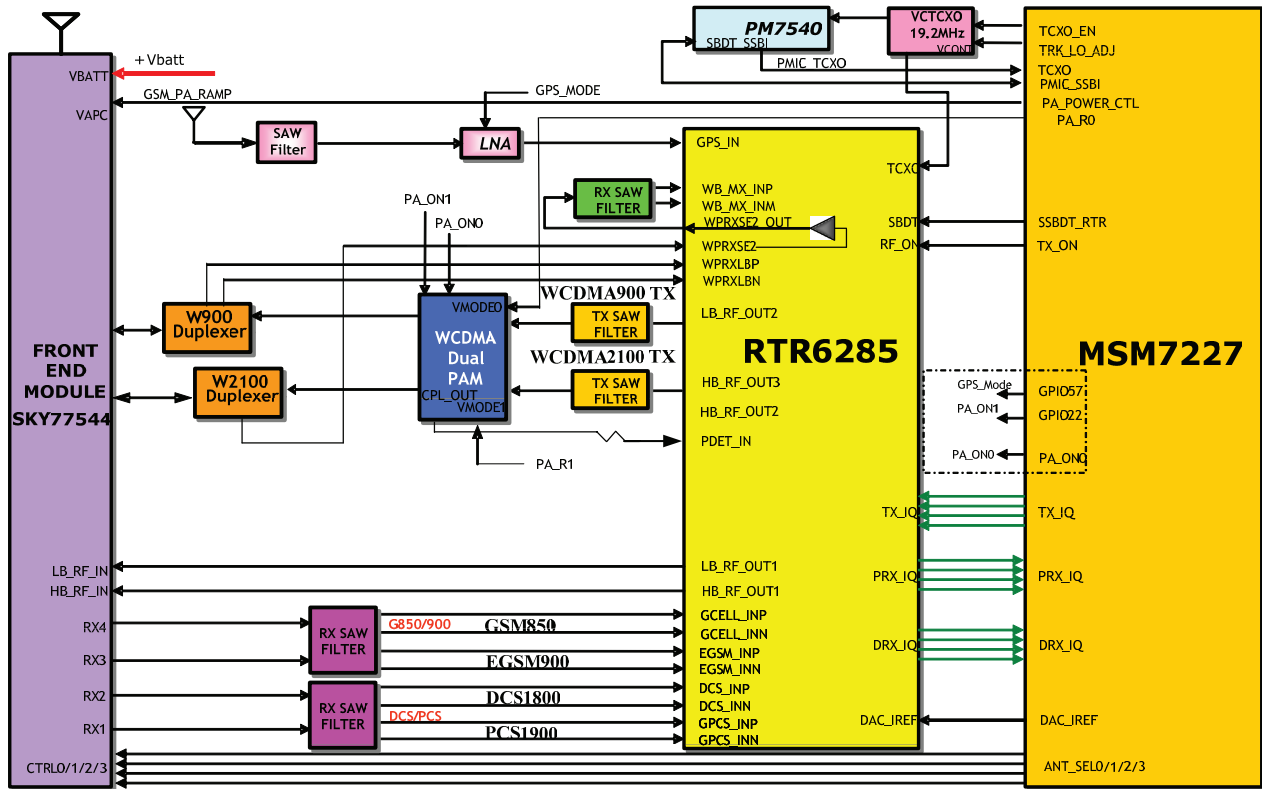
5. DOWNLOAD



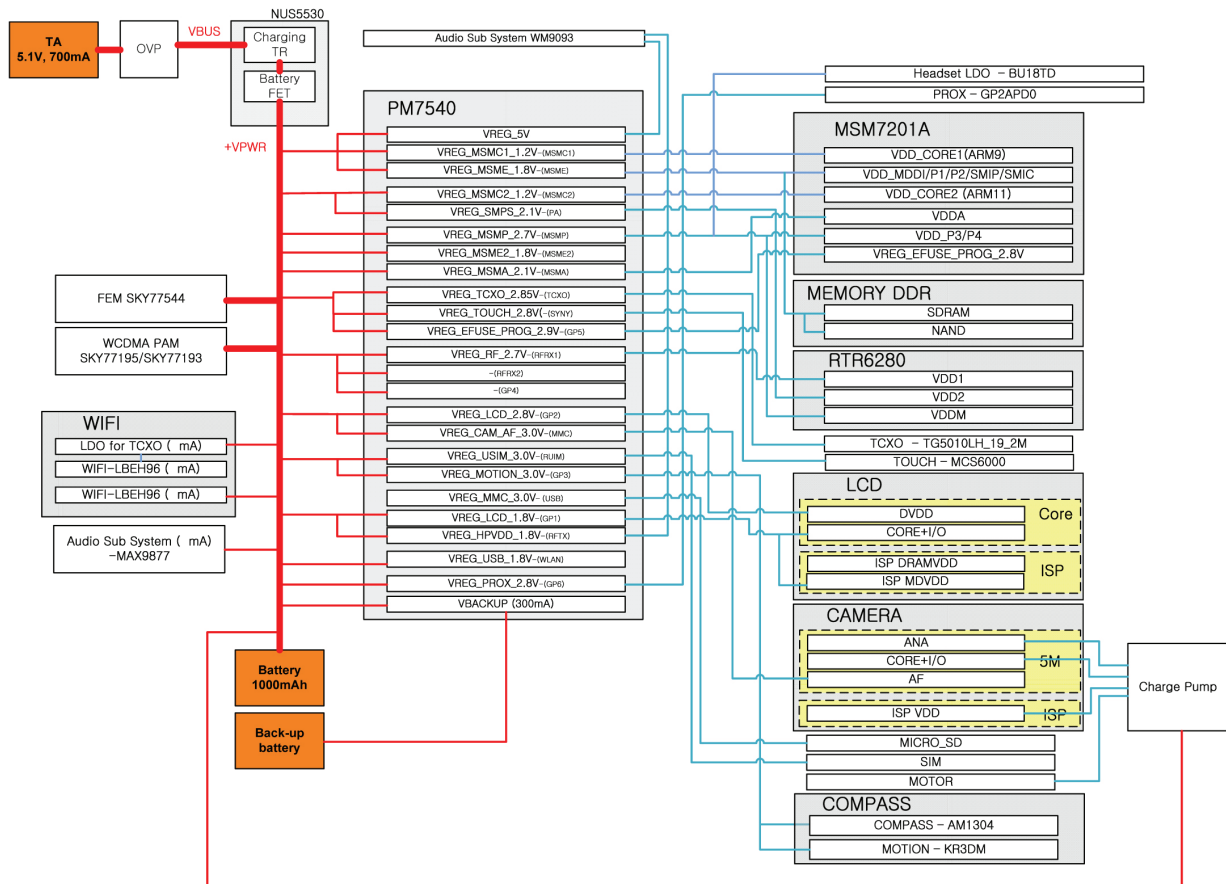
6. Block diagram



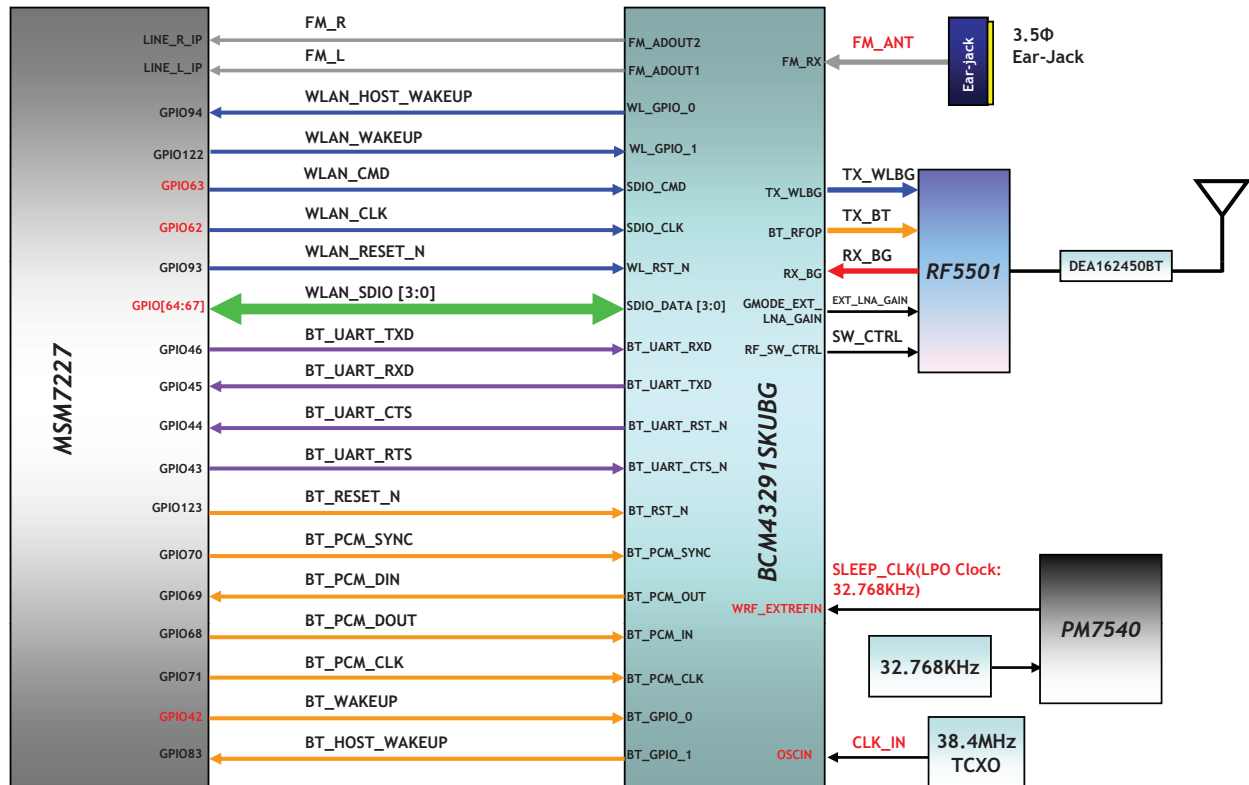
6. BLOCK DIAGRAM



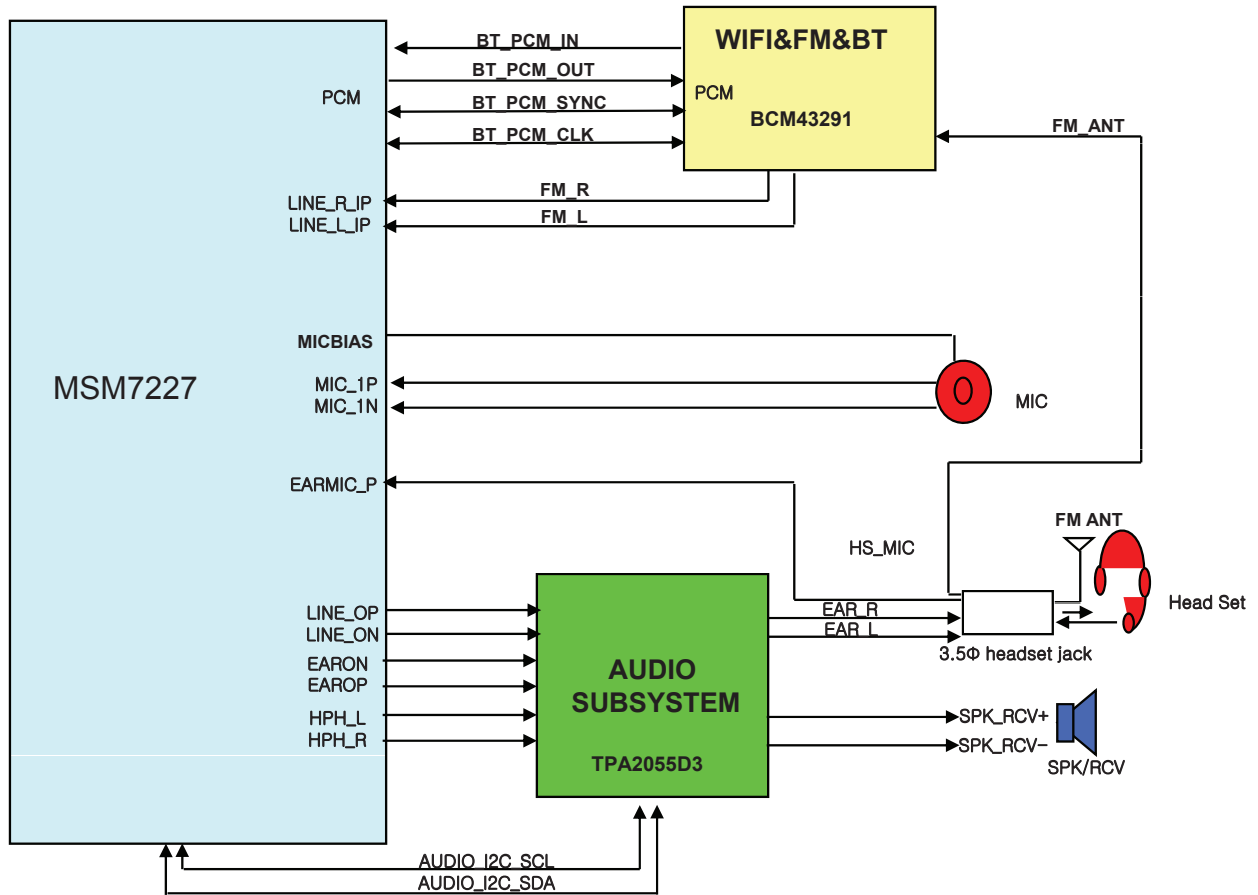
6. BLOCK DIAGRAM

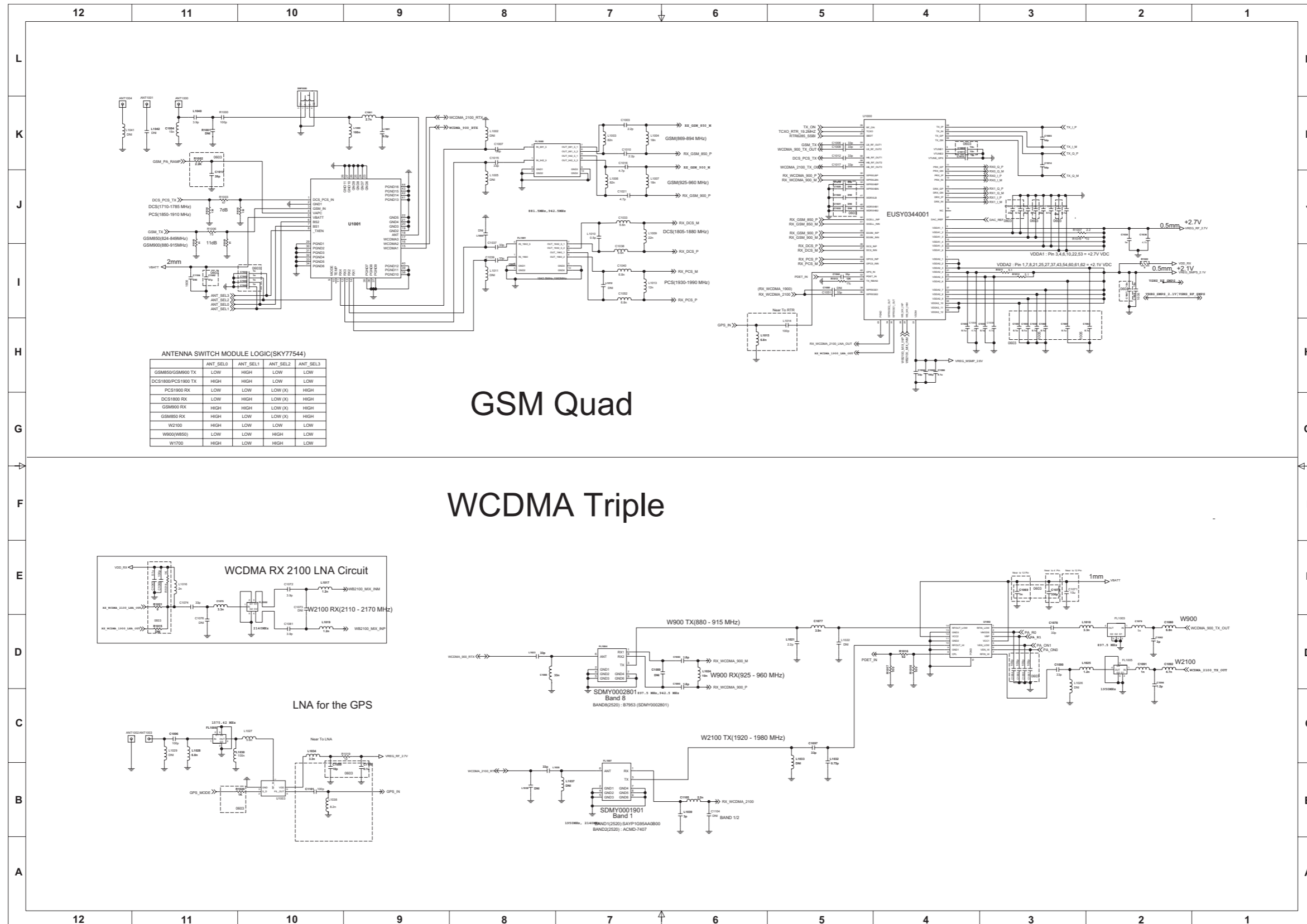


6. BLOCK DIAGRAM

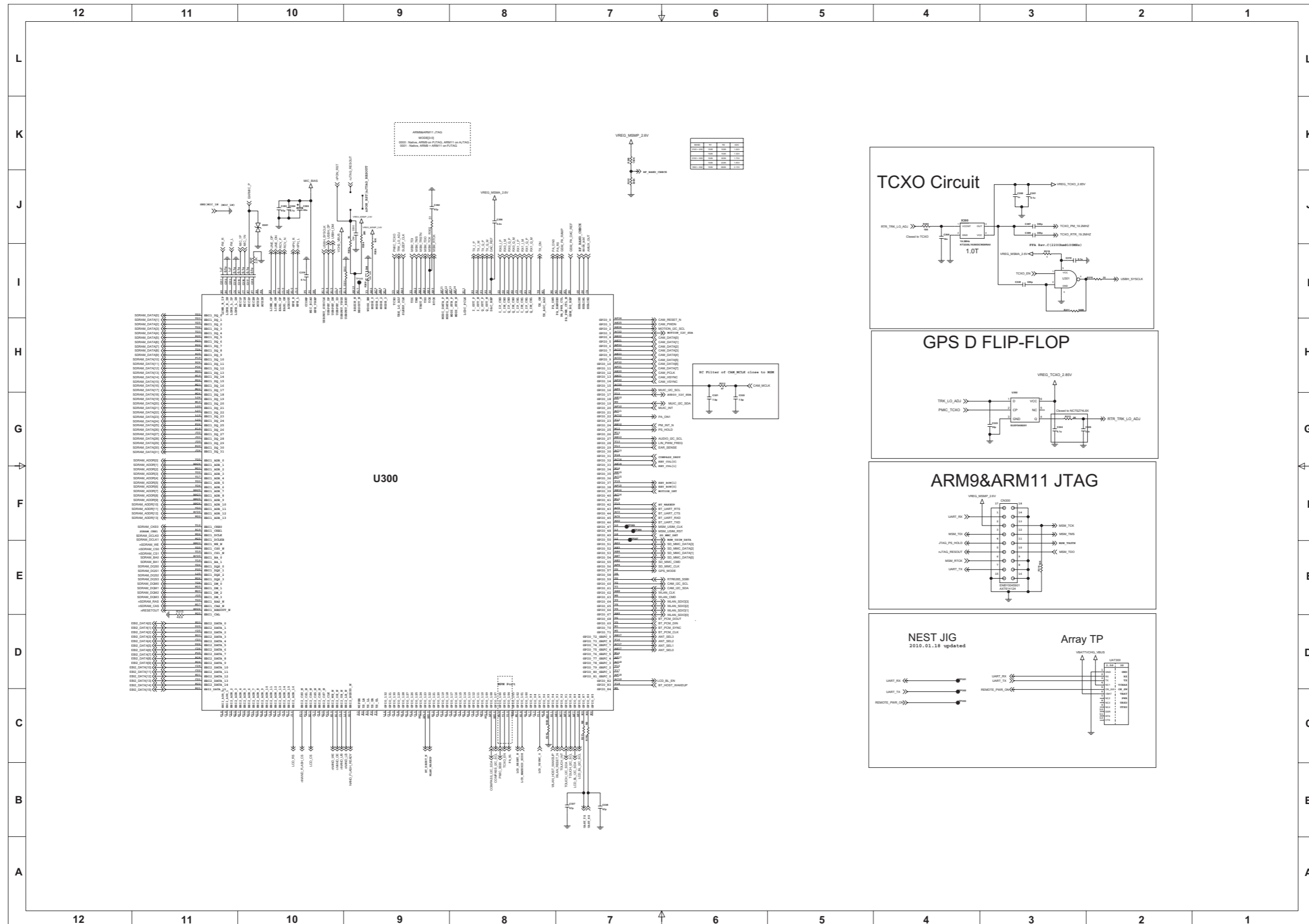


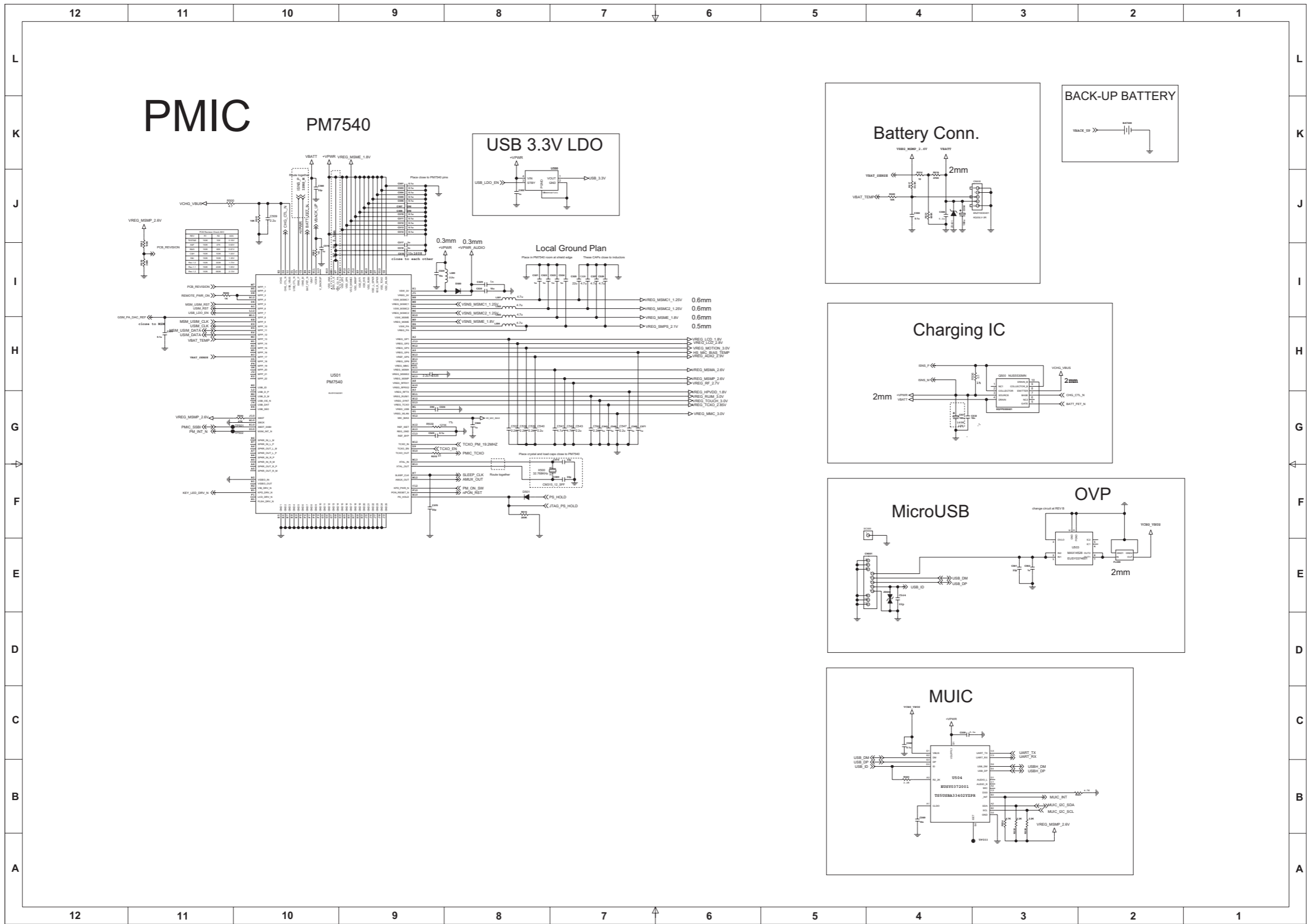
6. BLOCK DIAGRAM

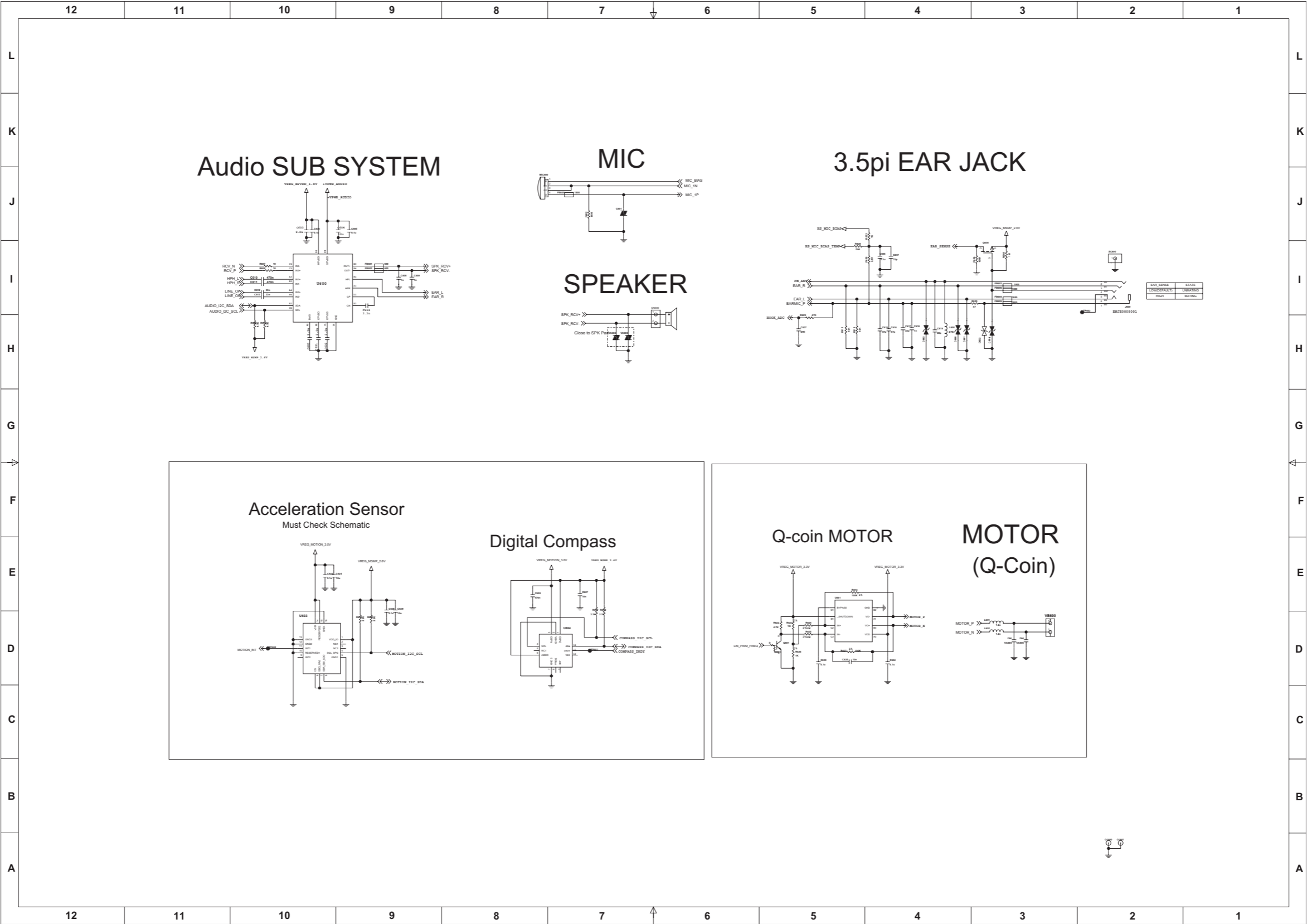


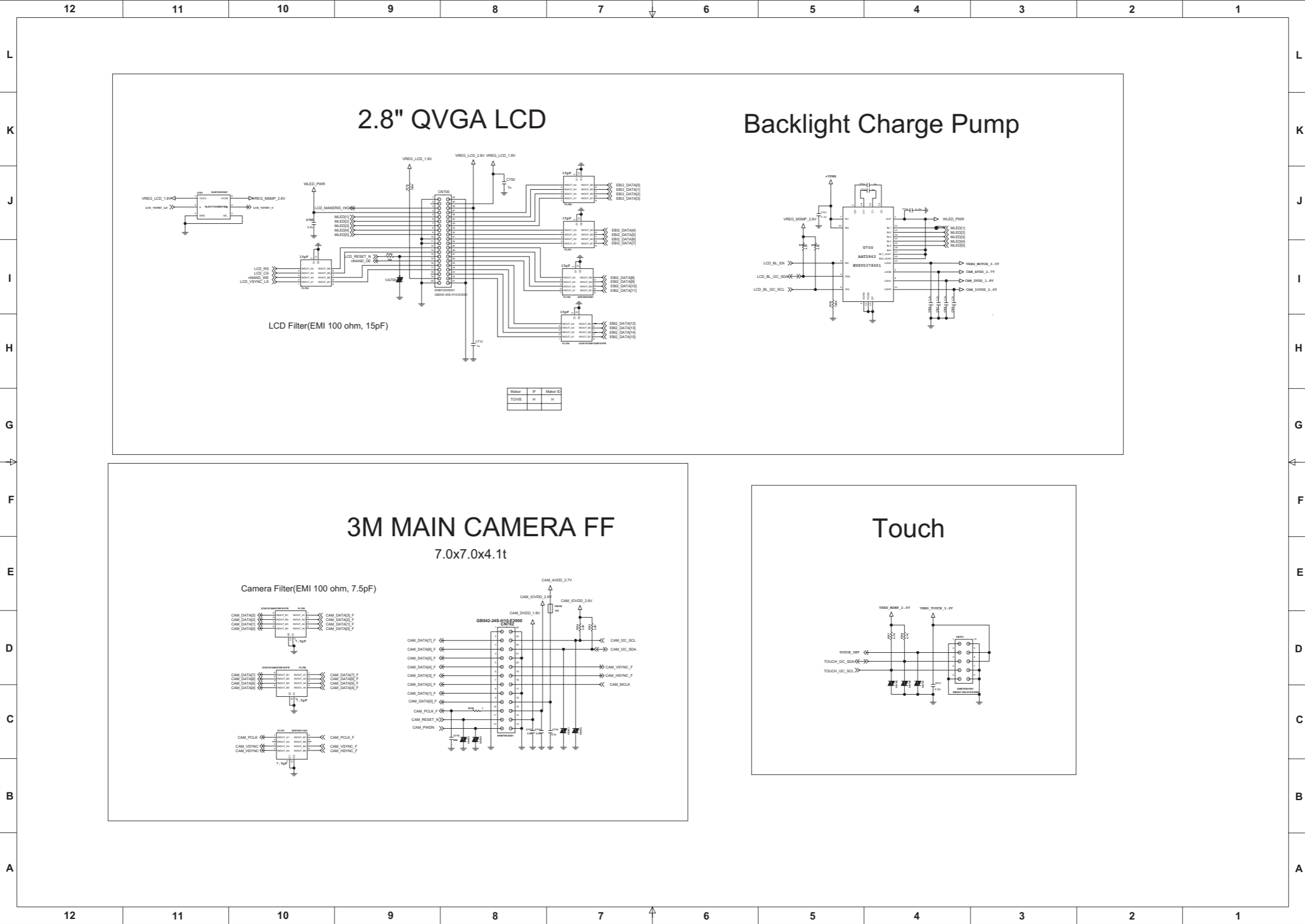


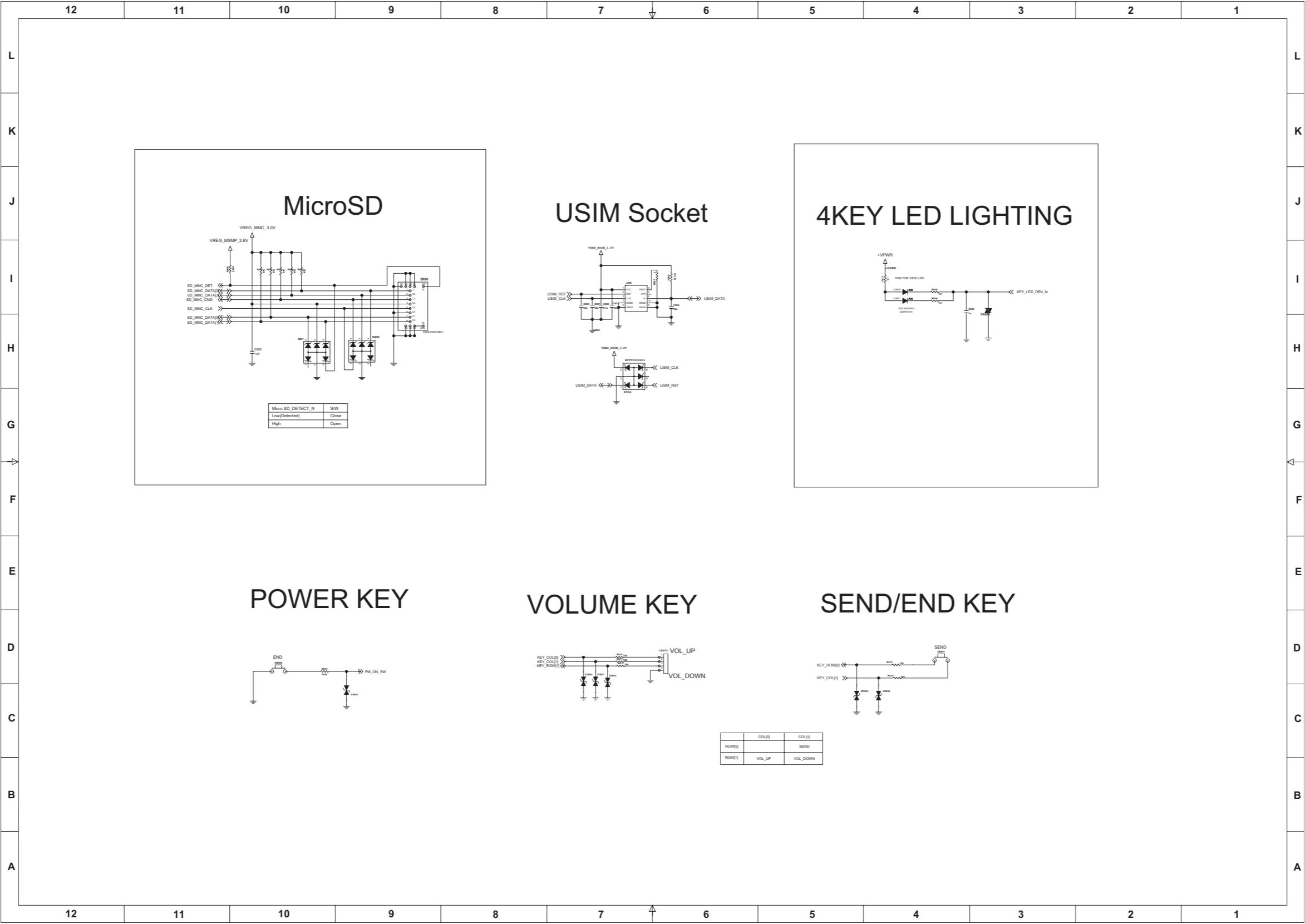
7. CIRCUIT DIAGRAM









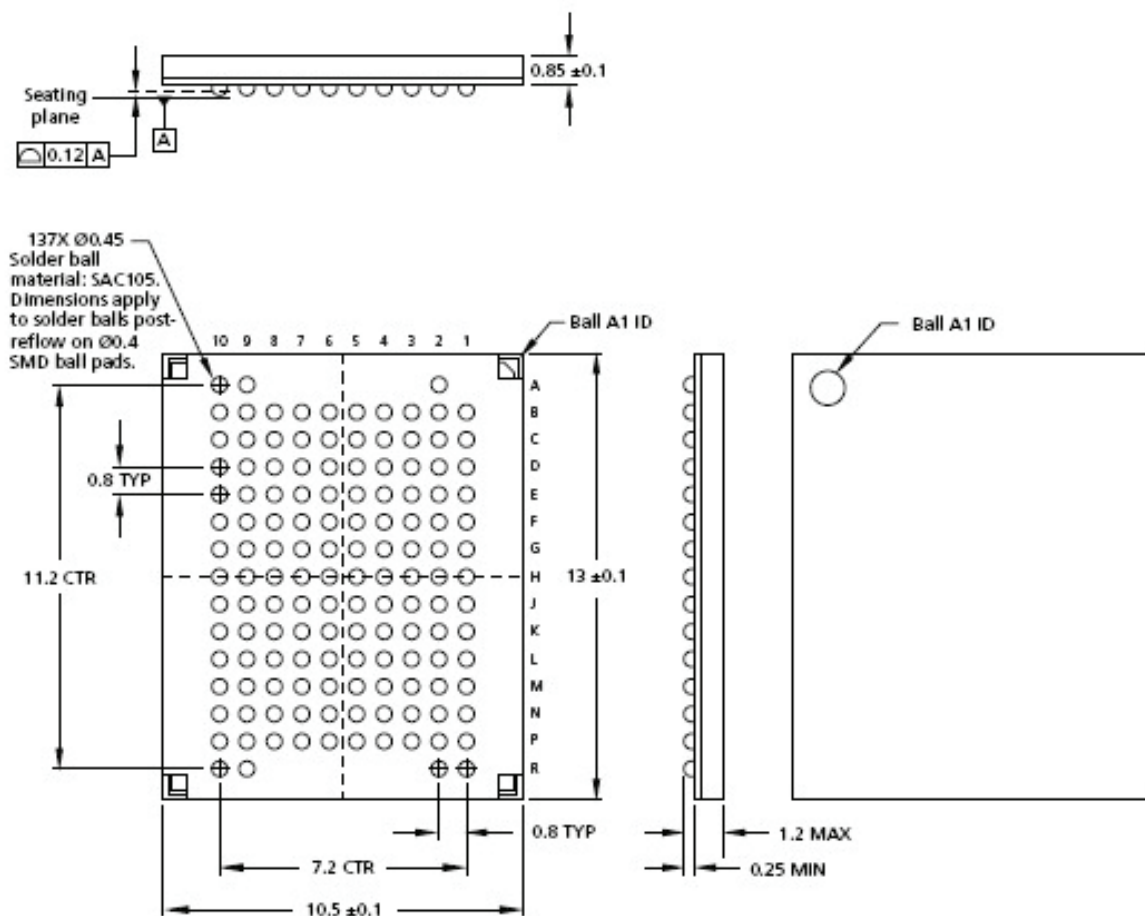


8. BGA PIN MAP

8. BGA PIN MAP

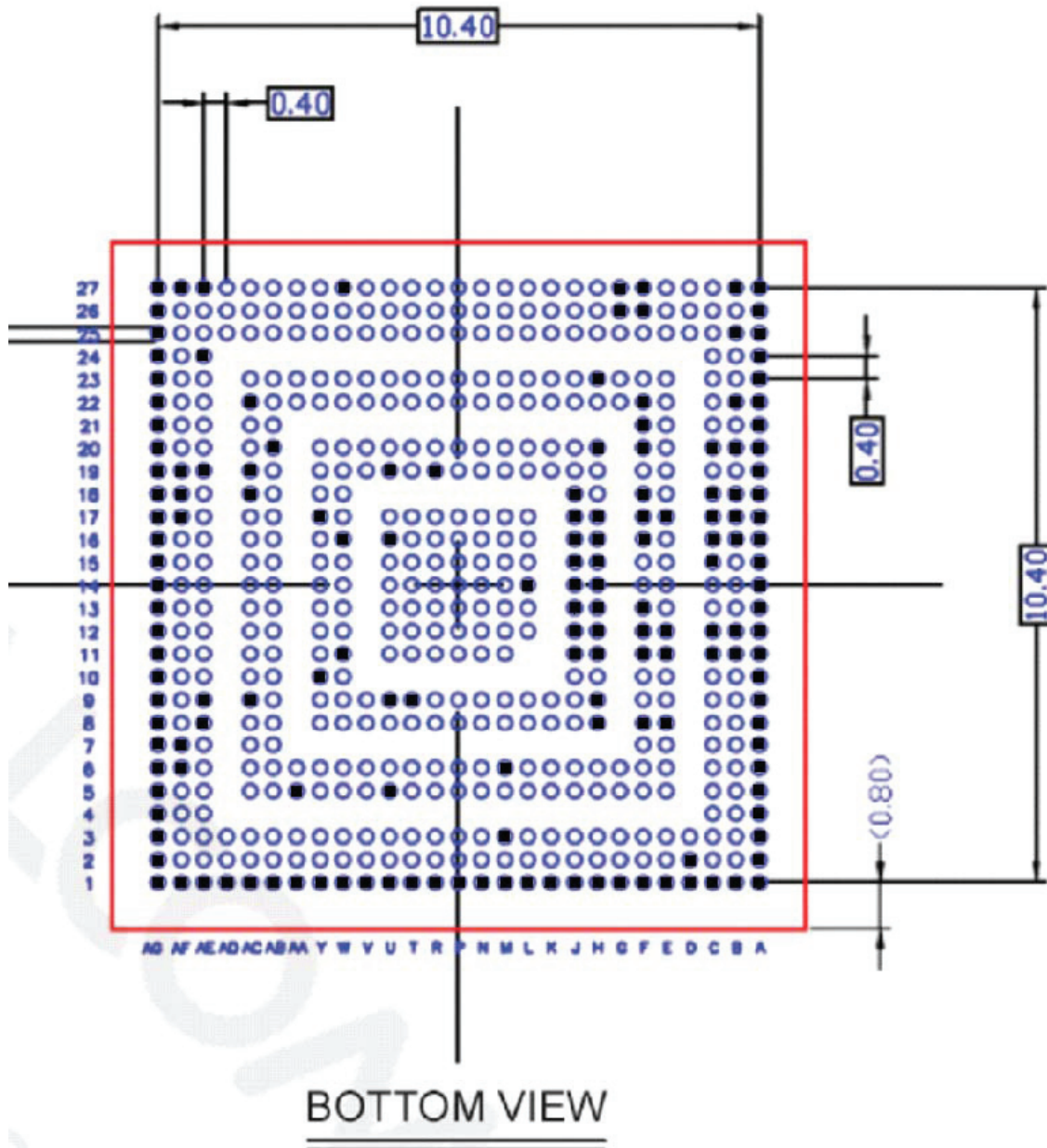
MCP

Figure 5: 137-Ball TFBGA (Package Code: JA)



- Notes:
1. All dimensions are in millimeters.
 2. Recommended pad size is 0.4 x 0.4mm.

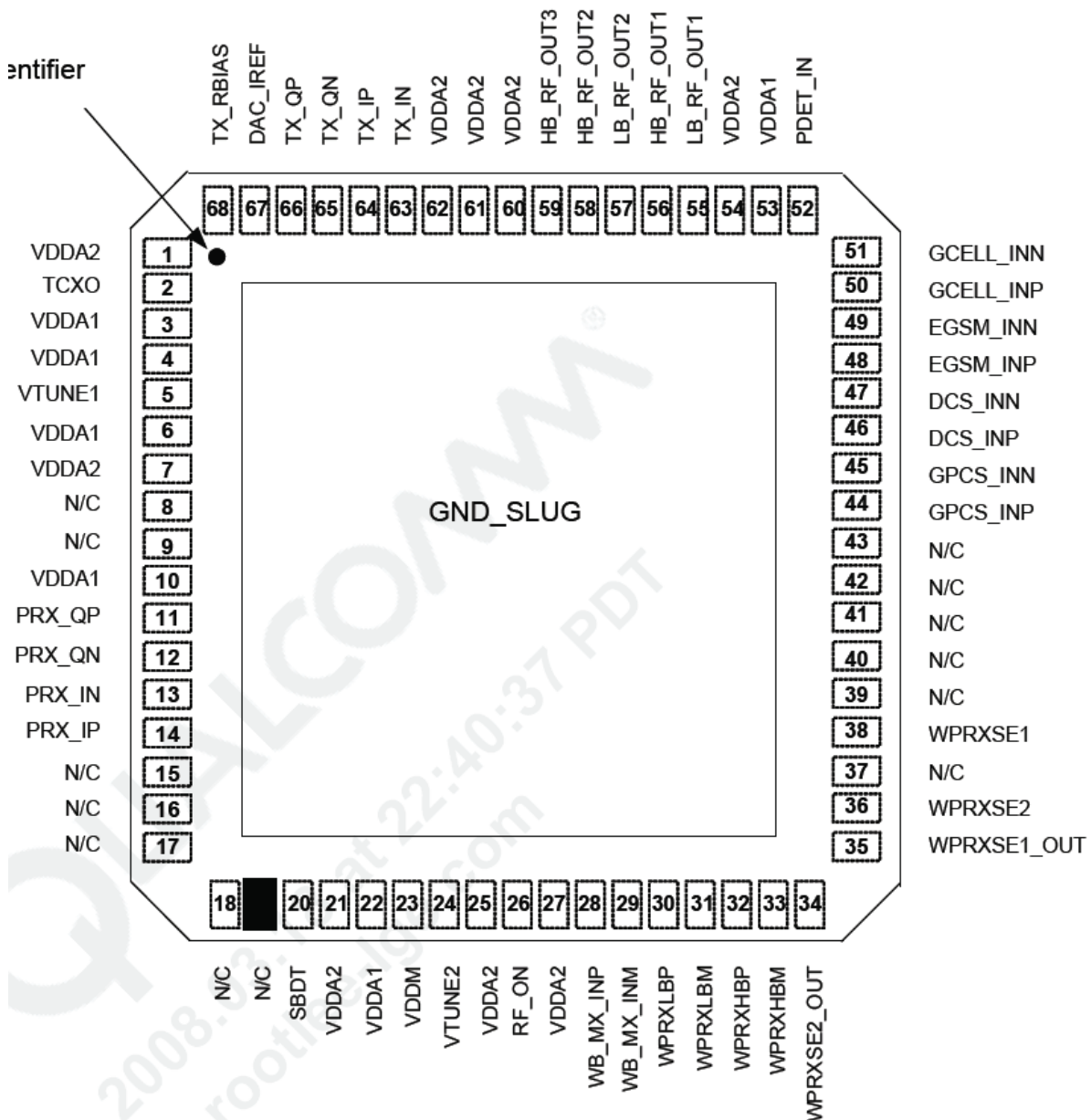
MSM7227



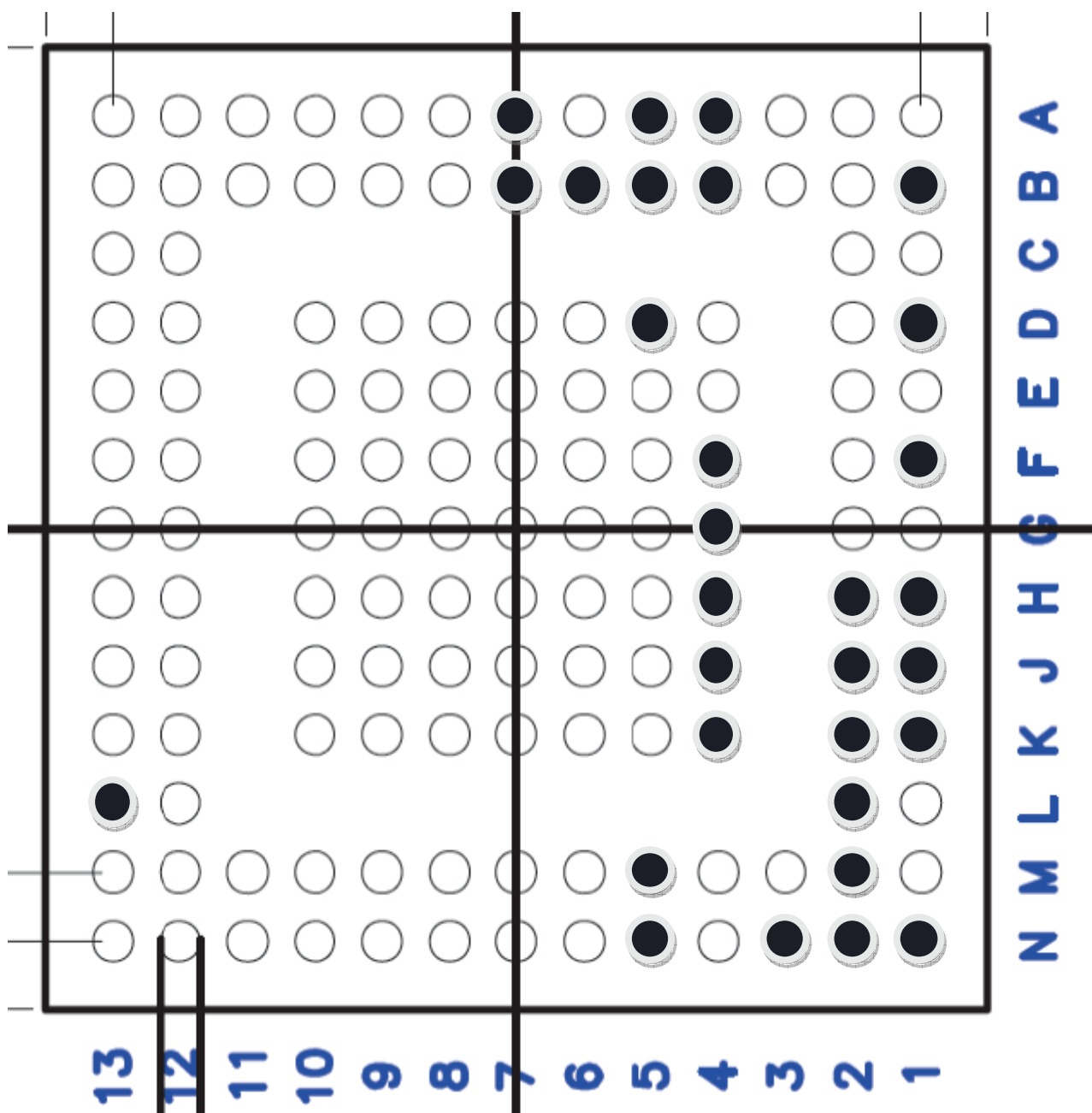
○ USE

● NOT IN USE

RTR6285(Top View)

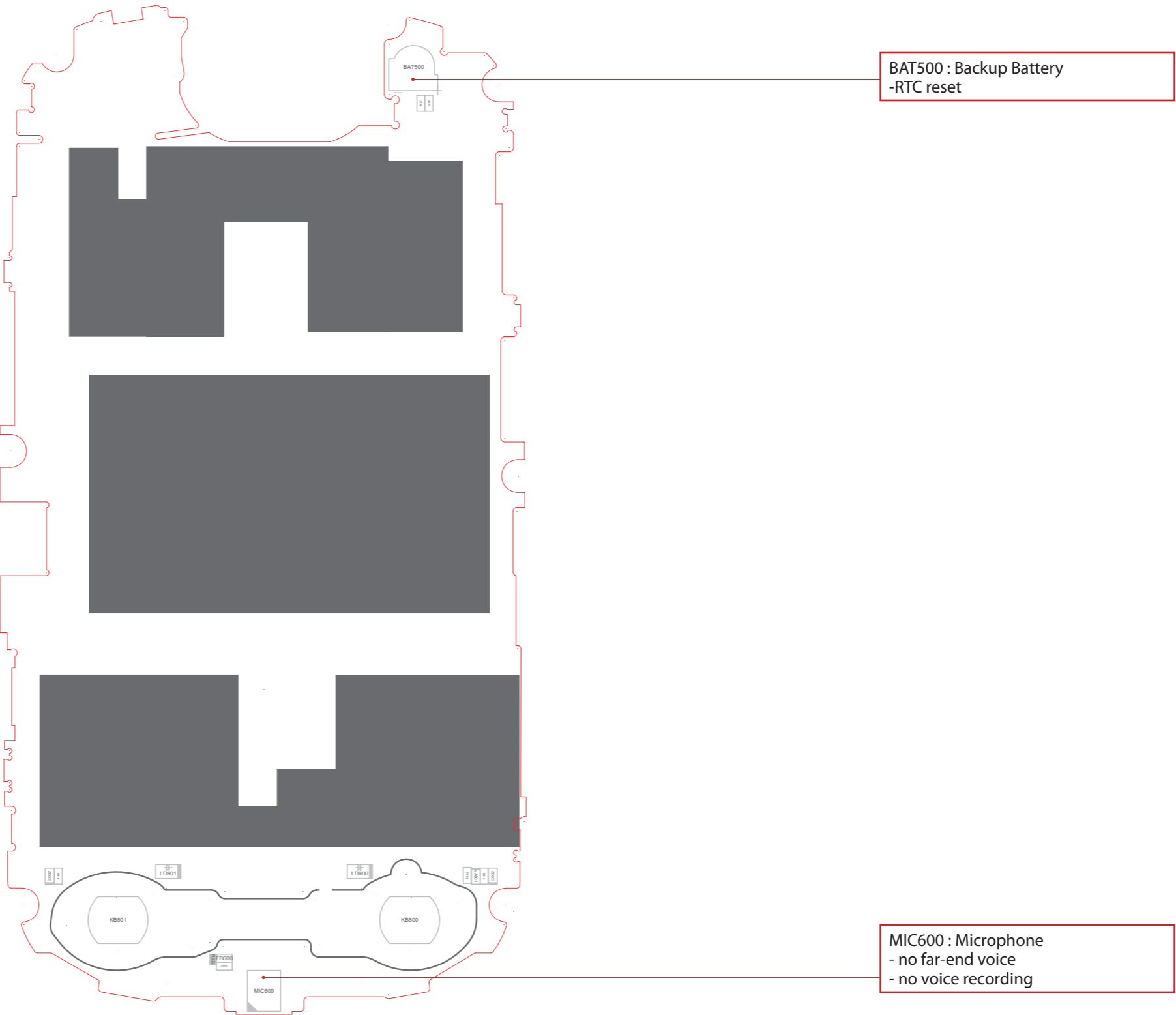


PM7540(PMIC)

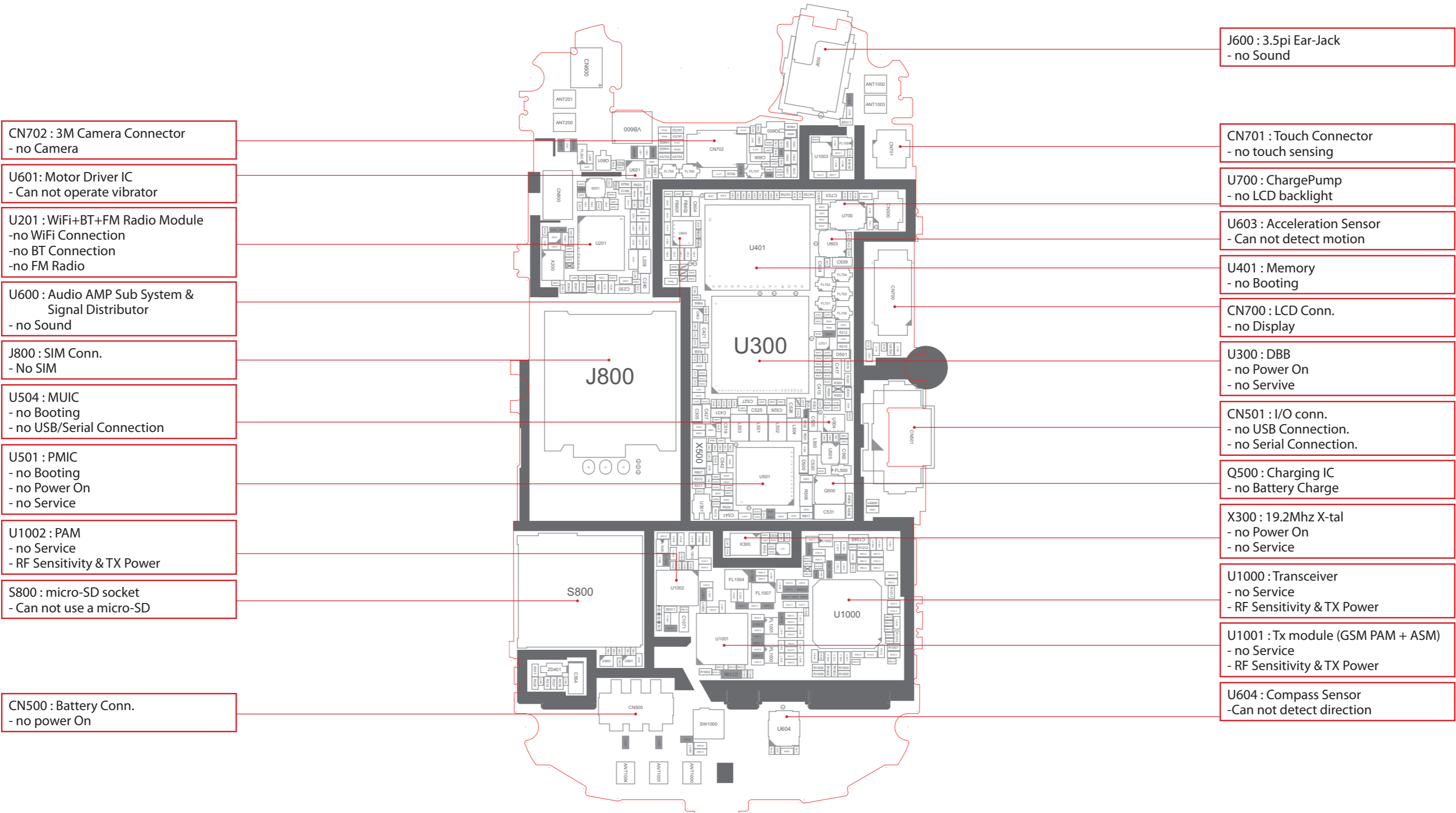


○ USE
● NOT IN USE

9. PCB LAYOUT



LG-P350_MAIN_SPFY0246001_1.1_TOP



LG-P350_MAIN_SPFY0246001_1.1_BOT

10. CALIBRATION

10.1 General Description

This document describes how to install and use the RF calibration software(Tachyon) of LG 3G mobile phone with Qualcomm Chipsets.

10.2 Requirement

Requirements for RF calibration of LGE mobile phone are outlined in the following sections.

10.2.1 Hardware

- 1) Desktop or laptop computer
- 2) Agilent 8960 Series 10 (E5515C) Testset
- 3) GPIB card and cable for communicating with Agilent 8960 Series 10 Testset
- 4) Power Supply, or 4V battery, and power cable for putting power on the mobile phone.
- 5) Data(USB or UART) cables for connecting the mobile phone to computer's serial port
- 6) RF cable

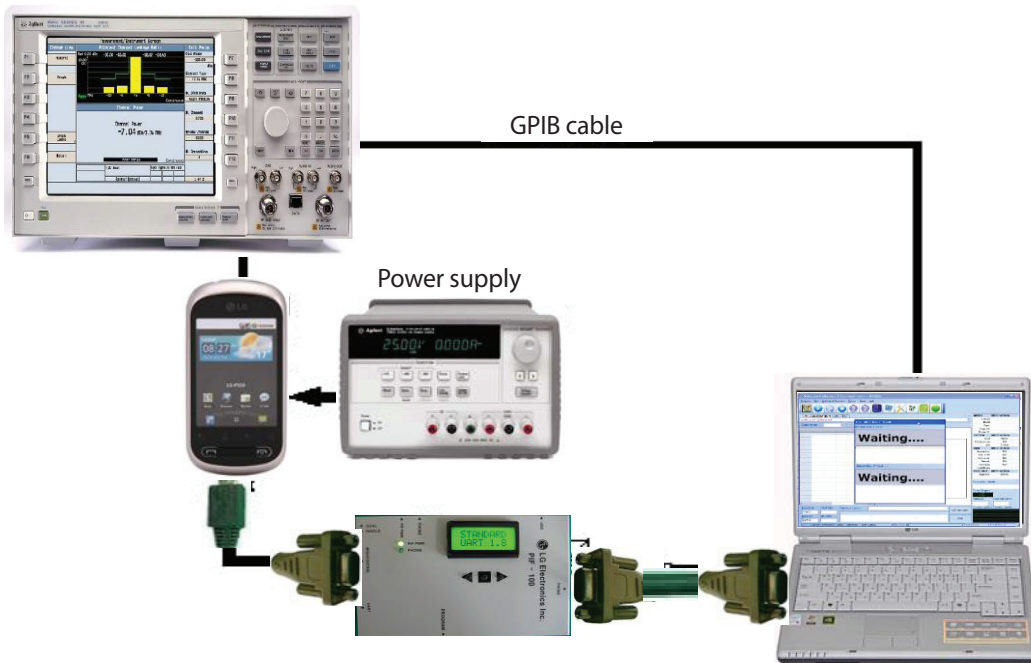
10.2.2 driver

- 1) National Instruments GPIB & VISA driver
- 2) LGE mobile USB driver
- 3) Data cable driver(optional)

10.2.3 System

- 1) Windows XP SP2 or better
- 2) RAM 512M or grater
- 3) HDD 1GB of available space

10.3 Setup for RF calibration



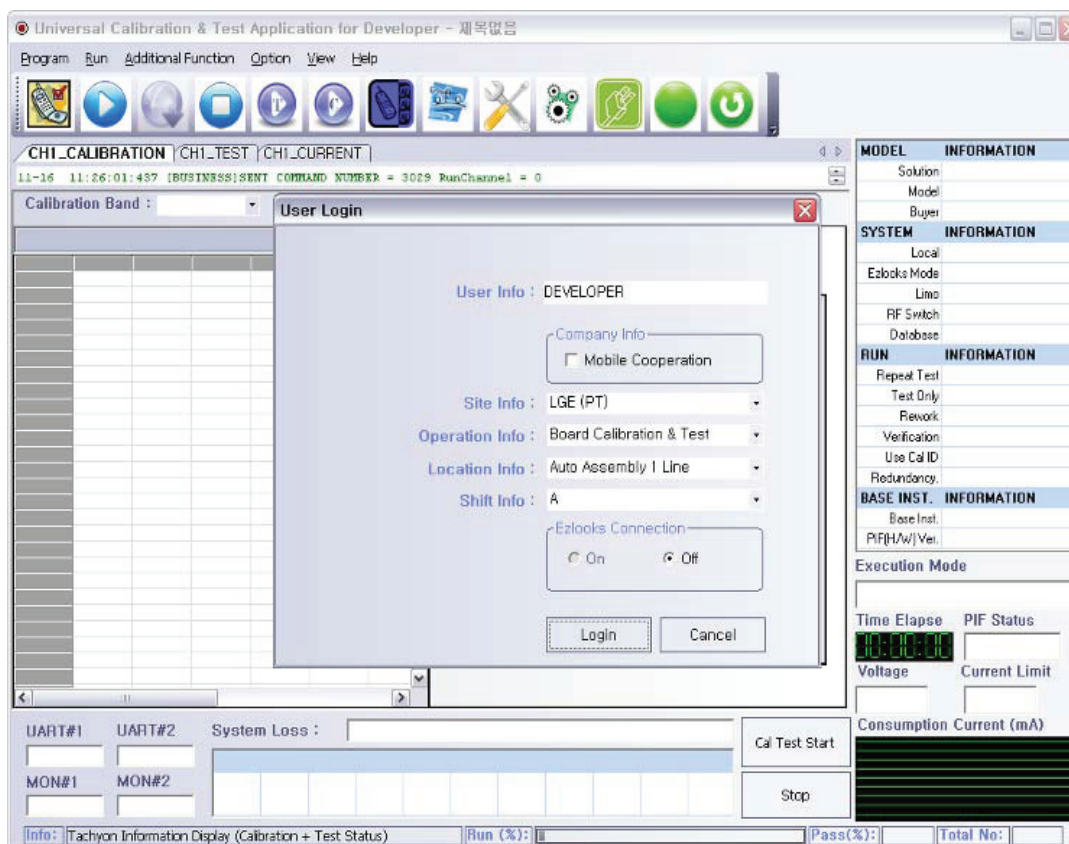
10.4 Tachyon Software Installation

- 1) Install Tachyon_setup_Eng_20090326.exe to C:/LGE/Tachyon directory.
- 2) Unzip Tachyon_Release_201011101.zip, and overwrite all files to the same path.
- 3) Install OCX_Registration.bat for registering Tachyon Components in C:/LGE/Tachyon/OCX/ directory.

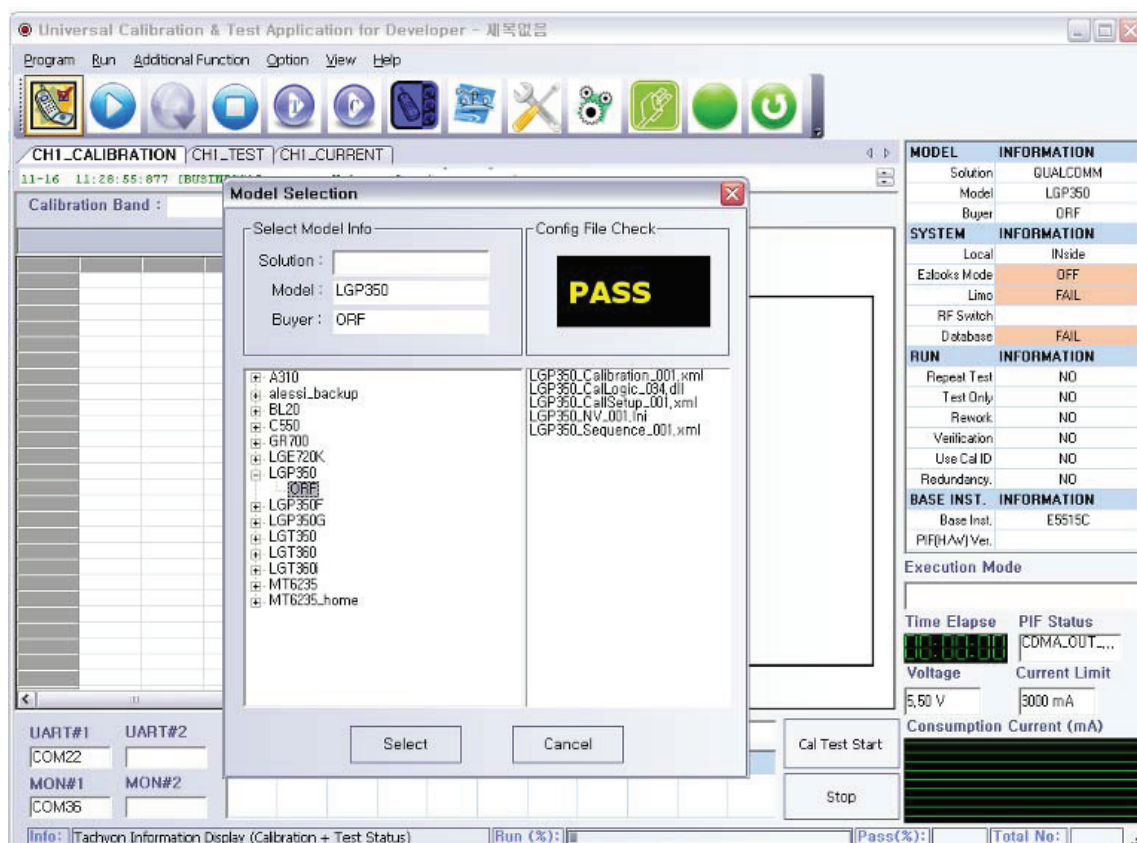
10.5 Tachyon Start

After hardware setup is completed successfully and Tachyon program is installed ordinarily, RF calibration or Auto Test can be start in the following procedure.

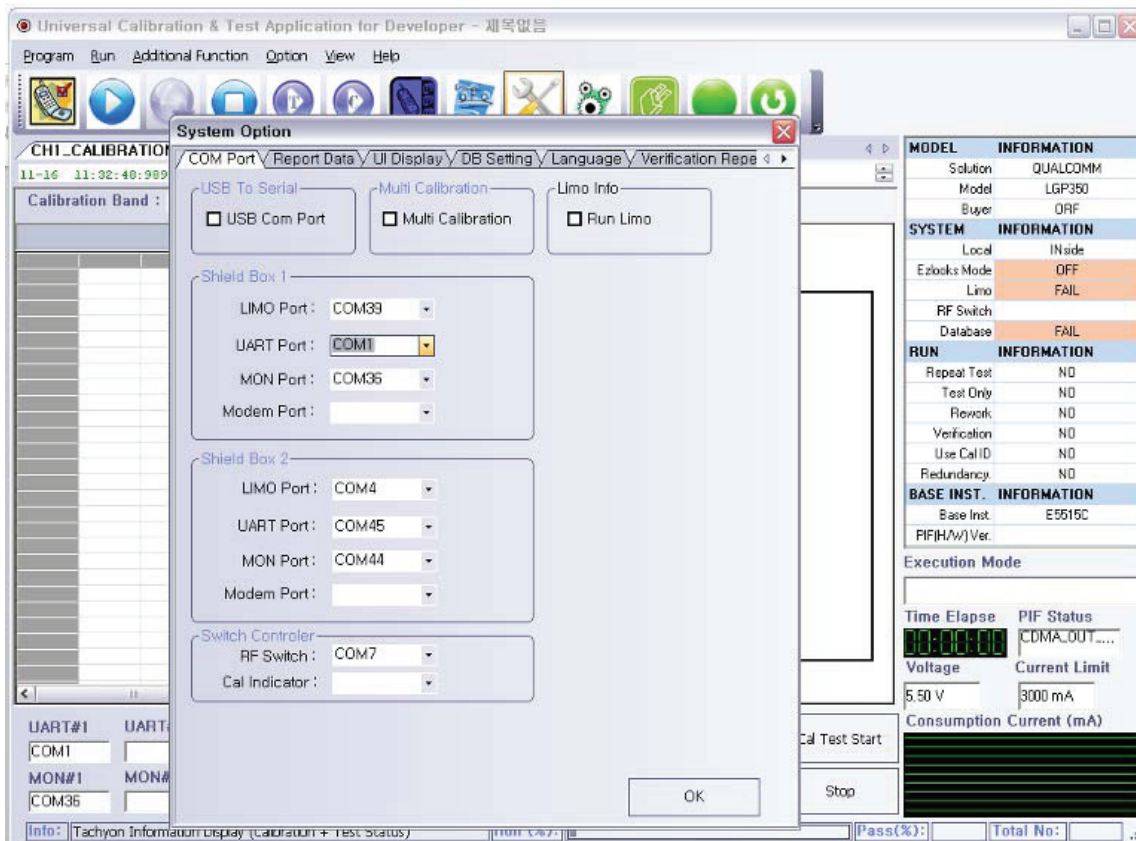
- 1) Execute Tachyon.exe in C:/LGE/Tachyon directory.
- 2) Click login button in the following login dialog window.



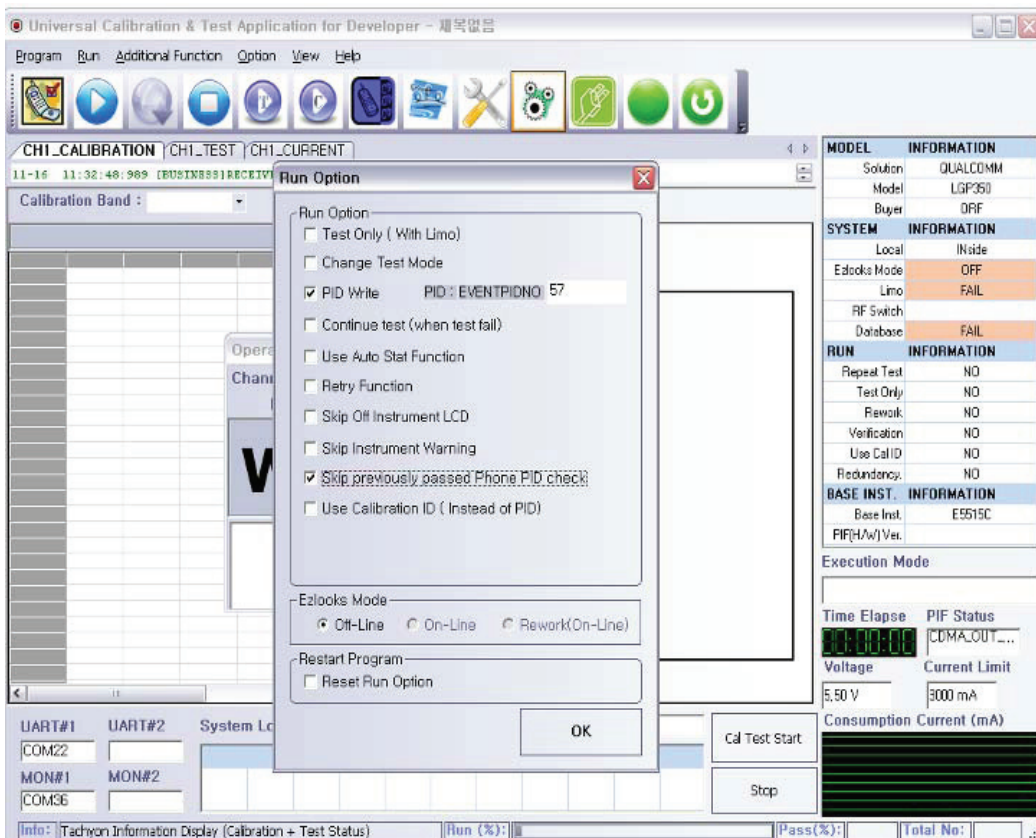
- 3) Click "model selection" button in toolbar for selecting the appropriate model.
- 4) Double click P350/ORF in model tree, and then click "select" button.



5) Click “system option” button in toolbar to connect the mobile phone to the Tachyon.



- 6) Click "run option" button in toolbar for passing over LGE factory setting.
- 7) Check "PID write" and "Skip previously Phone PID check"



8) Execute Hecaton.exe for setting RF cable loss to Agilent 8960. If not, Tachyon can't run.



9) Click "Calibration+Auto Test" button in Toolbar. Now RF calibration and autotest will start.

For more information, refer to the manual in C:/LGE/Tachyon/Manual folder.

10.6 Overview of RF Calibration

10.6.1 Supported entry of RF Calibration

As using RTR6285, P350 adopts some of calibrations in those of RTR6285. This is also supporting two band WCDMA and Quad band GSM. Table 1-1 and Table 1-2 describes the information listed for RF calibration items used by P350.

Table 1-1. The calibration list for WCDMA

Calibration	WCDMA 2100	WCDMA 900	description
Tx Sweep Calibration	○	○	Tx output power measurements
Tx Hdet Calibration	○	○	HDET ADC measurements vs Tx power
Tx Comp vs Freq Calibration	○	○	16-channel Tx output measurements in a certain PDM
Tx Secondary Comp vs Freq Calibration	X	X	Irregular Tx power measurements in a certain PDM
Tx Lim vs Freq Calibration	○	○	HDET ADC measurements in the Target Power
Rx DVGA Gain Offset Calibration	○	○	Rx DVGA gain measurements
Rx DVGA Gain Offset vs Freq Calibration	○	○	16-channel RX DVGA gain measurements
Rx LNA Range Offset Calibration	○	○	LNA gain offset measurements
Rx LNA Range Offset vs Freq Calibration	○	○	16-channel LNA gain offset measurements

Table 1-2. The calibration list for GSM

Calibration	GSM900	GSM850	GSM1800	GSM1900	description
VCO Calibration	○	X	X	X	Lowest frequency error- VCO measurement
Thermistor Calibration	X	X	X	X	Thermistor max/min ADC measurement
Tx External Polar Calibration	○	○	○	○	Tx output power measurements
Polar path delay Calibration	X	X	X	X	PM and AM signal path delay
Carrier Suppression Calibration	X	X	X	X	carrier power measurement
Rx Gain Range Calibration	○	○	○	○	8 or 16 channel Rx Gain measurements

For more information, refer to RTR6285-RTR6280-RTR6237-RGR1100-MXU6219_NV_ITEMS RevD.pdf (80-VD861-12 Rev. D)

10.6.2 Feature of RF calibration

Tachyon configuration is describes in this section.

The information indicates the state of the mobile phones will become a factor.

WCDMA band

Table 1-3 describes the calibration feature of WCDMA band.

Table 1-3. Feature of Tx/Rx calibration in WCDMA 2100/900 band

Item		Sub Item	WCDMA 2100	WCDMA 900
Calibration Channel		Tx	9883	2863
		Rx	10833	3088
Tx Target Power(dBm)			22.5	22.5
PAM gain switching(dBm)		High to low gain	11.0	11.0
		Low to high gain	14.0	14.0
High Gain Mode	Calibrated PDM Range	Max	222	227
		Min	160	134
	PDM step	2	3	
	Measured data of 32 array	26	25	
	Threshold of Power Range(dBm)	≥ Up threshold	25.0	25.0
		≤ Low threshold	6.0	6.0
Low Gain Mode	Calibrated PDM Range	Max	235	255
		Min	80	69
	PDM step	5	6	
	Measured data of 32 array	27	26	
	Threshold of Power Range(dBm)	≥ Up threshold	15.0	16.0
		≤ Low threshold	-55.0	-53.0
Allowable power range in HDET range(dBm)		≥ Lower limit	16.5	16.5
		≤ Upper limit	24.5	24.5
Allowable HDET adc range		≥ Lower limit	50	80
		≤ Upper limit	160	175
DVGA Calibration Power(dBm)			-74.0	-74.0
DVGA Calibration Range		≥ Lower limit	130	80
		≤ Upper limit	300	300
LNA Calibration Power(dBm)		Range 0-1	-66.0	-68.0
		Range 1-2	-42.0	-50.0
		Range 2-3	-26.0	-38.0
		Range 3-4	X	-26.0

Quad GSM band

Table 1-4 describes the calibration feature of Quad GSM bands.

Table 1-4. Feature of Tx/Rx calibration in Quad GSM band

Item	Sub item	GSM 900	GSM 850	GSM 1800	GSM 1900
Tx Calibration channel	F1	975	128	512	512
	F2	124	251	885	810
Power range in AMAM/AMPM NVs (dBm)	Max	34.0	34.0	31.0	31.0
	Min	-20.0	-20.0	-20.0	-20.0
Rx Gain Range Calibration Power (dBm)	Range 0	-80	-80	-80	-80
	Range 1	-80	-80	-80	-80
	Range 2	-50	-50	-50	-50
	Range 3	-50	-50	-50	-50
	Range 4	-50	-50	-50	-50
Rx Gain Range Calibration Range (Lower limit/Upper limit)	Range 0	1900/2500	1900/2500	1900/2500	1900/2500
	Range 1	1200/2300	1200/2300	1200/2300	1200/2300
	Range 2	1300/1900	1300/1900	1300/1900	1300/1900
	Range 3	1200/1800	1200/1800	1200/1800	1200/1800
	Range 4	1100/1700	1100/1700	1100/1700	1100/1700
Tx External Polar calibration PDM table	13025,1900,1950,2000,2050,2100,2150,2200,2250,2300,2350,2400,2450,2500,2550,2600,2650,2700,2750,2800,2850,2900,2950,3000,3075,3150,3225,3300,3375,3450,3525,3600,3675,3750,3825,3900,3975,4050,4125,4200,4275,4350,4425,4500,4575,4650,4725,4800,4875,4950,5025,5100,5175,5250,5325,5400,5475,5550,5625,5700,5775,5850,5925,6025,6125,6225,6325,6425,6525,6625,6725,6825,6925,7025,7125,7225,7325,7425,7525,7625,7725,7825,7925,8025,8125,8225,8325,8425,8525,8625,8725,8825,8925,9025,9125,9225,9325,9425,9525,9625,9725,9825,9925,10025,10125,10225,10325,10425,10525,10625,10725,10825,10925,11025,11125,11225,11375,11525,11675,11825,11975,12125,12275,12425,12575,12725,12875,13025,13175,13325,13475,13625,13775,13925,14075,14225,14375,14525,14675,14825,14975,15125,15275,15425,15575,15725,15875,16025,16175,16300				

Channels of RF Calibration

Table 1-5 Channel of WCDMA

W2100 Tx	9621	9638	9656	9673	9691	9708	9726	9743	9761	9778	9796	9813	9831	9848	9866	9883
W2100 Rx	10571	10588	10606	10623	10641	10658	10676	10693	10711	10728	10746	10763	10781	10798	10816	10833
W900 Tx	2712	2722	2733	2743	2754	2765	2776	2787	2796	2806	2815	2825	2834	2844	2853	2863
W900 Rx	2937	2947	2958	2968	2979	2990	3001	3012	3021	3031	3040	3050	3059	3069	3078	3088

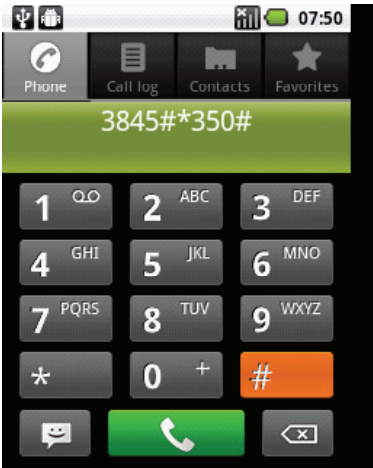

Table 1-5 Channel of GSM850/GSM900

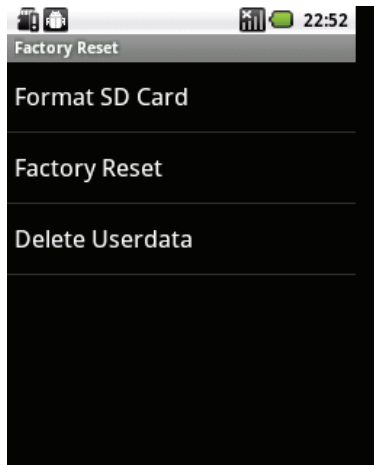
GSM850	12 8	14 5	16 3	180	19 8	215	23 3	251
GSM900	1	31	62	92	12 4	97 5	10 00	10 23

Table 1-7 Channel of GSM/1800/GSM1900

GSM1800	512	537	562	587	612	637	662	687	712	737	762	787	812	837	862	885
GSM1900	512	532	552	572	592	612	632	652	672	692	712	732	752	772	792	810

11. STAND ALONE TEST

	<p>Hidden Menu Start Start shortcut keys: 3845#*350#</p>
	<p>Hidden Menu List Start the desired menu: Menu, click</p>
	<p>Version Info Classified Information representation</p>

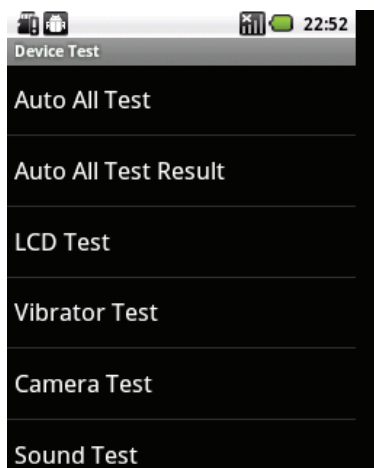


Factory Reset

Format SD Card : SD Card Data reset

Factory Reset : Changing the Factory

Delete Userdata : Disabled

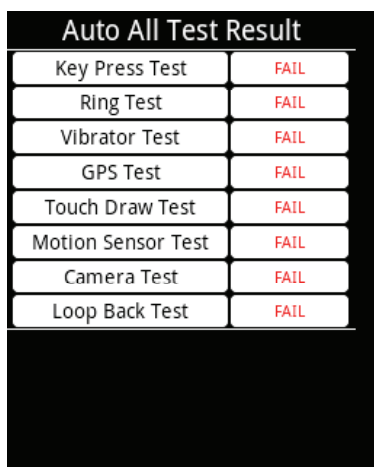


Device Test List

Auto All Test :

-> Auto All Test menu click

-> Continuous information on the menu, giving you ability test

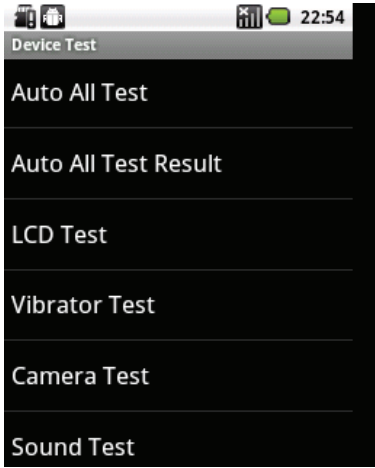
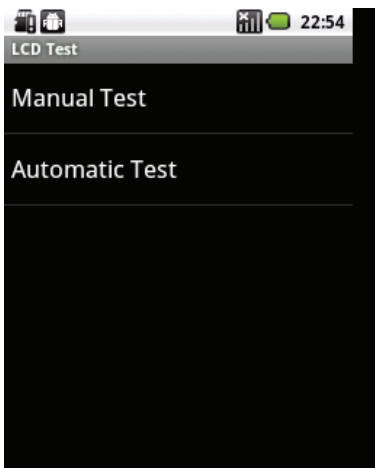



Auto All Test Result

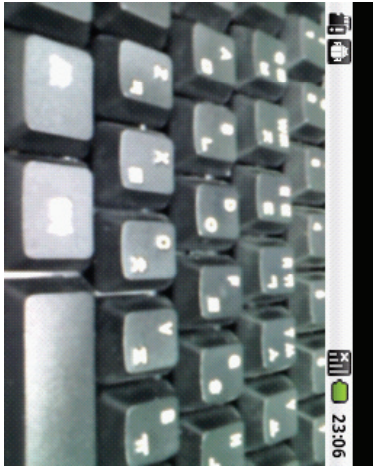
Auto All Test Result

-> From the factory with the ability to view the results screen

11. STAND-ALONE TEST

 <p>The screenshot shows the 'Device Test' application interface. At the top, there is a status bar with icons for signal strength, battery, and the time 22:54. Below the title bar, the menu items are listed: 'Auto All Test', 'Auto All Test Result', 'LCD Test', 'Vibrator Test', 'Camera Test', and 'Sound Test'.</p>	<p>Device Test List</p> <p>Auto All Test : Device functionality testing at the factory to use Auto All Test Result : Test Result LCD Test : Display test(Color) Proximity Test : Proximity Sensor Vibrator Test : Vibrator test Camera Test : Camera & Cam test Sound Test : Sound test RTC Test : Date/Time Setting Touch Test : Display touch test Motion Sensor test : Motion Sensor test External Memory Test : SD Card Write test Compass Test : Compass Test GPS Test : GPS Test IRT Test : N/A</p>
 <p>The screenshot shows the 'LCD Test' application interface. At the top, there is a status bar with icons for signal strength, battery, and the time 22:54. Below the title bar, the menu items are listed: 'Manual Test' and 'Automatic Test'.</p>	<p>LCD Test List</p> <p>Manual Test : Click on the following screen Automatic Test : Automatically, without clicking</p> <ul style="list-style-type: none"> - White Display - Black Display - Red, Green, Blue, White Display - Red, Green, Blue, White Display 2
 <p>The screenshot shows the 'Vibrator Test' application interface. At the top, there is a status bar with icons for signal strength, battery, and the time 22:55. Below the title bar, there is an 'EXIT' button in the top right corner. The main menu items are: 'Vibration ON', 'Vibration OFF', '5000 ms', '7000 ms', '9000 ms', '10000 ms', and '15000 ms'.</p>	<p>Vibrator test</p> <p>A case-by-state vibration tests</p>

11. STAND-ALONE TEST



Camera test

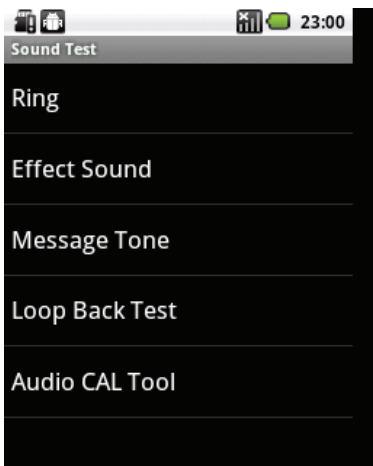
Menu features disabled

This feature is part of Auto All Test replaced by

-> Auto All Test

-> Camera test

-> Cam test



Sound test

Ring : Ringtone test

Effect Sound :

Message Tone :

Loop Back test : Mic & Speak loop Back test

Audio CAL Tool : Setting

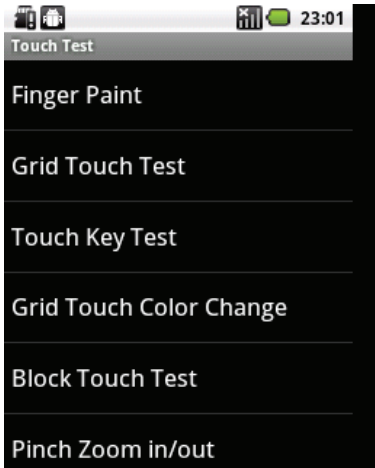
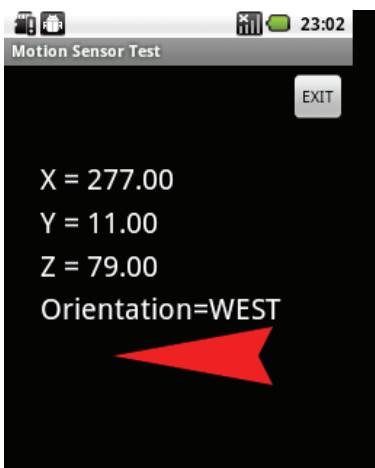
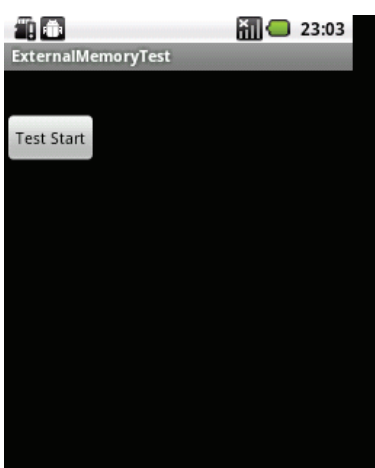
-> Ring menyujung Enabled



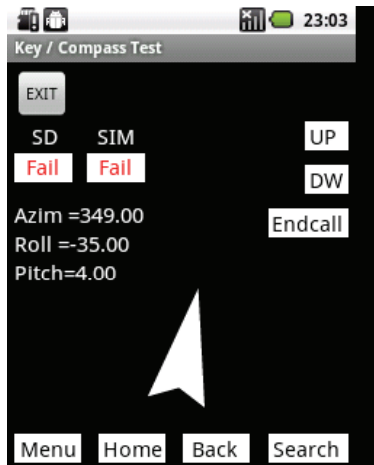
RTC test

Date & time : setting

11. STAND-ALONE TEST

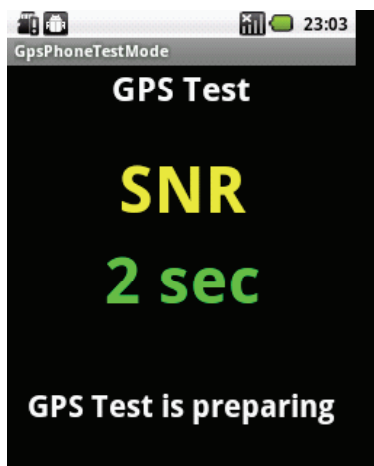
 <p>The screenshot shows a black screen with a white title bar at the top. The title bar contains icons for a phone, a battery, and a signal strength indicator, followed by the time 23:01. Below the title bar, the text 'Touch Test' is displayed. A list of test options is shown in white text on a black background: 'Finger Paint', 'Grid Touch Test', 'Touch Key Test', 'Grid Touch Color Change', 'Block Touch Test', and 'Pinch Zoom in/out'.</p>	<p>Touch test</p> <p>Finger Print : Free mode test</p> <p>Grid Touch Test : Block mode on touch point mode test</p> <p>Touch Key Test : key test</p> <p>Grid Touch Color Change</p> <p>Block Touch Test</p> <p>Pinch Zoom in/out : Multi touch Test</p> <p>Touch Information : Read Touch IC & Firmware Version</p>
 <p>The screenshot shows a black screen with a white title bar at the top. The title bar contains icons for a phone, a battery, and a signal strength indicator, followed by the time 23:02. Below the title bar, the text 'Motion Sensor Test' is displayed. In the top right corner, there is a small white button labeled 'EXIT'. The screen displays the following data in white text: 'X = 277.00', 'Y = 11.00', 'Z = 79.00', and 'Orientation=WEST'. A large red arrow points towards the bottom right of the screen.</p>	<p>Motion Sensor test</p> <p>Motion Sensor test</p> <p>-> 4 Check the operation of the sensor in the direction of lean</p>
 <p>The screenshot shows a black screen with a white title bar at the top. The title bar contains icons for a phone, a battery, and a signal strength indicator, followed by the time 23:03. Below the title bar, the text 'ExternalMemoryTest' is displayed. In the top left corner, there is a small white button labeled 'Test Start'.</p>	<p>External Memory Test</p> <p>SD Card test</p> <p>-> Write a test check of the SD Card memory</p>

11. STAND-ALONE TEST



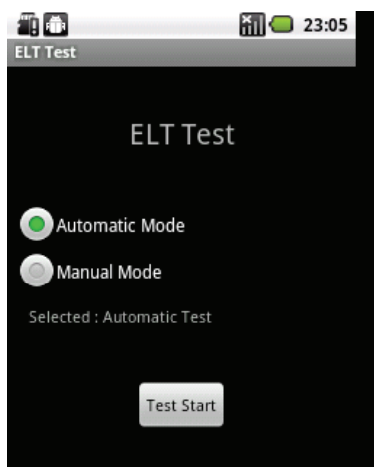
Key / Compass Test

SD Card : Check Recognition
SIM Card : Check Recognition
Up/Down key : Check Recognition
End Call key : Check Recognition
Menu key : Check Recognition
Home key : Check Recognition
Back key : Check Recognition
Search key : Check Recognition
Compass test



GPS Test

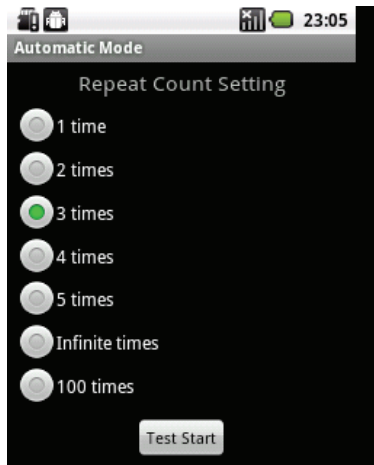
GPS test : GPS check recognition



ELT Test

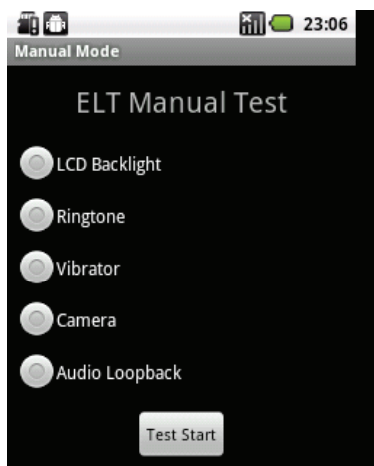
Automatic Mode
Manual Mode

11. STAND-ALONE TEST



ELT Test

Automatic Mode : LCD Automatic on/off test
-> time setting

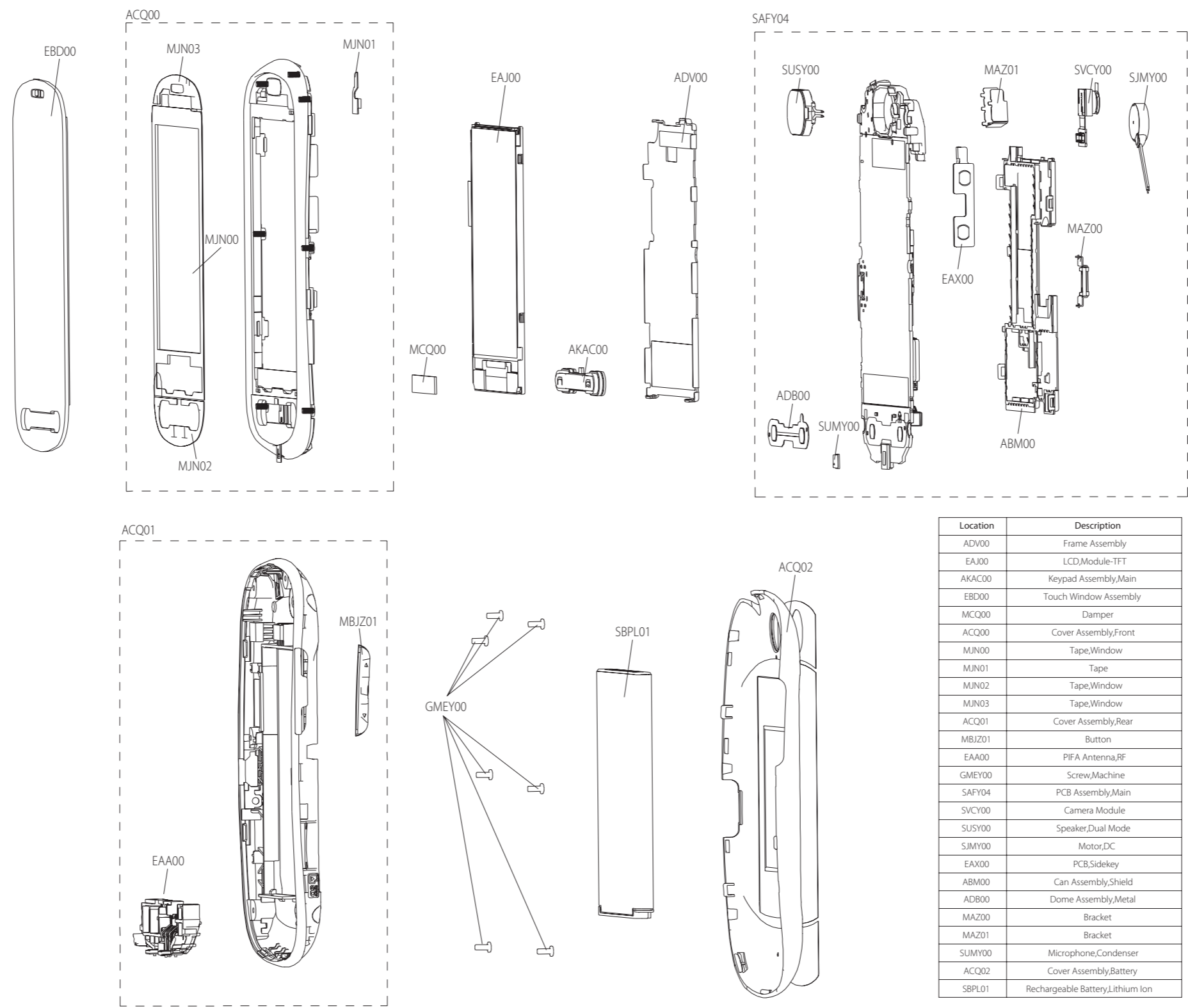


ELT Manual Test

LCD Backlight
Ringtone
Vibrator
Camera
Audio Loopback
-> test on the device is working
(The ability to use plant)

12. EXPLODED VIEW & REPLACEMENT PART LIST

12.1 EXPLODED VIEW



12. EXPLODED VIEW & REPLACEMENT PART LIST

12.2 Replacement Parts <Mechanic component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
1	AGQ000000	Phone Assembly	- APEY0992409	LGP350.ADEUSV SV:Silver -	
2	MEZ002100	Label, Approval	MLAA0062316	COMPLEX GU280 OREBK ZZ:Without Color COMPLEX, (empty), , , ,	
2	ACQ100400	Cover Assembly, EMS	- ACQ85468411	LGP350.ADEUSV SV:Silver -	
3	ACQ003400	Cover Assembly, Bar	- ACQ85334101	LGP350.APRTZY BK:Black -	
4	ADV00	Frame Assembly	- ADV73968301	LGP350.APRTZY SV:Silver -	
5	MDQ000000	Frame	MFEZ0045501	COMPLEX LG-P350 PRT SV:Silver PRESS, STS,	
5	MDS000000	Gasket	MDS63537101	COMPLEX LGP350.APRTZY ZZ:Without Color LCD_FRAME	
5	MDS000001	Gasket	MDS63612601	COMPLEX LGP350.APRTZY ZZ:Without Color LCD FRAME_2	
4	EAJ00	LCD, Module-TFT	EAJ61771701	LM283DN2A QVGA 2.8INCH 240X320 400CD COLOR 70% 4/3 500:1 60Hz Inverter N - TOVIS	
4	AKAC00	Keypad Assembly, Main	AKAC0025501	LG-P350 PRT SV:Silver -	
4	EBD00	Touch Window Assembly	EBD60946001	LGEC59 CAPACITIVE TOUCH F/F MELFAS MCS6000 2.8" B/B - ELK Corporation	
4	MEZ000000	Label	MLAZ0038303	COMPLEX LG-LC3200 WA:White PRINTING, PPRI PRINTING	
4	MCQ00	Damper	MCQ66567501	COMPLEX LGP350.APRTZY ZZ:Without Color LCD MODULE	
4	MJN061100	Tape, Protect	MJN67679701	COMPLEX LGP350.APRTZY ZZ:Without Color WINDOW	
4	MJN061101	Tape, Protect	MJN67772801	COMPLEX LGP350.APRTZY ZZ:Without Color tape, protection [bar]	
4	ACQ00	Cover Assembly, Front	- ACQ85334201	LGP350.APRTZY BK:Black -	
5	MDJ000001	Filter	MDJ63008601	COMPLEX LGP350.APRTZY ZZ:Without Color FILTER_SPEAKER [SK4350 + PSR0.3T + SK4350 + 250MESH + SK4350]	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
5	MDJ000000	Filter	MDJ63008501	COMPLEX LGP350.APRTZY ZZ:Without Color FILTER_MIC [250MESH + SK4350]	
5	MCK032700	Cover, Front	- MCJK0142601	COMPLEX LG-P350 PRT SV:Silver MOLD, PC LUPOY SC-1004A,	
6	MET099500	INSERT, NUT	MICE0016907	MECH_COMMON ZY, ZZ, PRESS, STS, , , , ,	
5	MJN000001	Tape	MJN67681501	COMPLEX LGP350.APRTZY ZZ:Without Color TAPE, KEYPAD	
5	MCQ000000	Damper	MPBZ0367801	COMPLEX LG-P350 PRT SV:Silver MOLD, Urethane Rubber S195A,	
5	MJN00	Tape, Window	MJN67681301	COMPLEX LGP350.APRTZY ZZ:Without Color -	
5	MJN01	Tape	MJN67681401	COMPLEX LGP350.APRTZY ZZ:Without Color FPCB_TOUCH_PANEL[FD8152N]	
5	MHK000000	Sheet	MHK63311201	COMPLEX LGP350.APRTZY BK:Black SPEAKER SHEET	
5	MEA000000	Guide	MGDZ0003001	COMPLEX LG-P350 PRT SV:Silver MOLD, PC LUPOY SC-1004A,	
5	MJN02	Tape, Window	MJN67679601	COMPLEX LGP350.APRTZY ZZ:Without Color TAPE, WINDOW_BOTTOM	
5	MJN03	Tape, Window	MJN67694501	COMPLEX LGP350.APRTZY ZZ:Without Color TAPE, WINDOW_TOP	
3	ACQ01	Cover Assembly, Rear	- ACQ85334301	LGP350.APRTZY SV:Silver -	
4	MBJZ01	Button	MBJZ0054101	COMPLEX LGP350.APRTZY SV:Silver PC+TPU double mold	
4	EAA00	PIFA Antenna, RF	EAA62405902	LS01-I-10084-A0 MULTI -2DB 3:1 Metal Stamping Type - LS Mtron Ltd.	
4	MBL000000	Cap	MCCZ0052501	COMPLEX LG-P350 PRT BK:Black PC+TPU double mold	
4	MHK000000	Sheet	MHK63325901	COMPLEX LGP350.APRTZY ZZ:Without Color MOBILE SWITCH	
4	MCK063300	Cover, Rear	MCJN0134701	MOLD PC LG-P350 PRT SV:Silver PC+GF10% LGC GP2102-EM59	
4	MCQ015700	Damper, Connector	MCQ66498001	COMPLEX LGP350.APRTZY ZZ:Without Color PSR 0.6T + SK4810	
4	MCQ015701	Damper, Connector	MCQ66498101	COMPLEX LGP350.APRTZY ZZ:Without Color PSR 0.6T + SK4810	
4	MCQ009400	Damper, Camera	MCQ66498201	COMPLEX LGP350.APRTZY ZZ:Without Color -	
4	MCQ049800	Damper, Motor	MCQ66498301	COMPLEX LGP350.APRTZY ZZ:Without Color -	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
4	MCQ015702	Damper, Connector	MCQ66569301	COMPLEX LGP350.APRTZY ZZ:Without Color camera	
4	MJN089300	Tape, Window	MJN67679101	COMPLEX LGP350.APRTZY ZZ:Without Color TAPE, CAMERA WINDOW	
4	MJN061100	Tape, Protect	MJN67679501	COMPLEX LGP350.APRTZY ZZ:Without Color TAPE, PROTECTION [VOLUME]	
4	MKC009400	Window, Camera	MWAE0070001	CUTTING PC SHEET LG-P350 PRT BK:Black PC SHEET 0.2T + SK4350	
3	GMEY00	Screw, Machine	GMEY0014301	GMEY0014301 BH + 1.4mM 3.5mM MSWR NI PLT N - KUMGANG SCREW CO., LTD	
3	SAFY04	PCB Assembly, Main	- SAFY0400309	LGP350.ADEUSV 1.0 MAIN	
4	EBR071500	PCB Assembly, Main, Insert	- EBR72902101	LGP350.APRTZY 1.0 MAIN	
5	MCQ000002	Damper	MCQ66591401	COMPLEX LGP350.APRTZY ZZ:Without Color PAD_PCB_MIC	
5	MCQ000000	Damper	MCQ66510101	COMPLEX LGP350.APRTZY ZZ:Without Color water_protection_lcd_conn	
5	MCQ000001	Damper	MCQ66510001	COMPLEX LGP350.APRTZY ZZ:Without Color water_protection_touch_conn	
5	EAA030100	PIFA Antenna, RF	EAA62405802	ACB-000094 TRIPLE -2DB 3:1 - - MOBITECH CORPORATION	
5	RAA050100	RESIN, PC	BRAH0001301	UF-1060, ; , , , , [empty]	
5	SVCY00	Camera Module	SVCY0029201	HSIS-LM38MIFF LG-P350 PRT HANSUNG ELCOMTEC CO., LTD.	
5	SUSY00	Speaker, Dual Mode	SUSY0028901	BRS-181213SL08-P Nd-Fe-B 700mW 8OHM 90DB 710HZ 1812*3.0T WIRE BUJEON ELECTRONICS CO., LTD	
5	SJMY00	Motor, DC	SJMY0007116	WHVM-1030Q10 2 V, 65 mA, 10 *3.0T, 3V, WOOSUNG G&T CO., LTD	
5	EAX00	PCB, Sidekey	EAX63985801	EAX63985801 LGP350.APRTZY 1.0 POLYI Double 2layer 1mm SIDEKEY SI FLEX CO., LTD	
5	ABM00	Can Assembly, Shield	- ABM73476101	LGP350.APRTZY SV:Silver -	
6	MBK070300	Can, Shield	MCBA0103901	COMPLEX LG-P350 PRT SV:Silver PRESS, STS,	
6	MEZ000900	Label, After Service	MLAB0001102	COMPLEX C2000 CGRSV WA:White C2000 USASV DIA 4.0 PRINTING,	
6	MEV000000	Insulator	MEV63756401	COMPLEX LGP350.APRTZY ZZ:Without Color insulator_can_shield	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	MCQ000000	Damper	MCQ66588501	COMPLEX LGP350.APRTZY ZZ:Without Color DAMPER_CAN, SHIELD	
5	ADB00	Dome Assembly, Metal	ADB73558901	LGP350.APRTZY ZZ:Without Color -	
4	EBR071800	PCB Assembly, Main, SMT	- SAFF0299003	LGP350.ADEUSV 1.0 MAIN	
5	SAD010000	Software, Mobile	SAD32886501	V10A - EUROPE QCT -	
5	MEZ000000	Label	MLAZ0038301	COMPLEX LG-VX6000 ZZ:Without Color PID Label 4 Array PRINTING,	
5	SAFC00	PCB Assembly, Main, SMT Bottom	- SAFC0161701	LGP350.APRTZY 1.0 MAIN	
6	MAZ00	Bracket	MAZ63011101	PRESS STS 304 0.3 LGP350.APRTZY ZZ:Without Color -	
6	MAZ01	Bracket	MAZ63063201	COMPLEX LGP350.APRTZY SV:Silver EARJACK	
6	SW1000	Connector, RF	ENWY0007901	KMS-518(P) NONE STRAIGHT RF ADAPTER SMD T/REEL AU 50OHM 650mDB HIROSE KOREA CO., LTD	
5	SAFD00	PCB Assembly, Main, SMT Top	- SAFD0159101	LGP350.APRTZY 1.0 MAIN	
6	SUMY00	Microphone, Condenser	SUMY0010609	SPU0410HR5H -PB SPU0410HR5H -PB, UNIT, 42 dB, 3.76*2.95*1.1, mems smd mic KNOWLES ACOUSTICS	
6	BAT500	Capacitor Assembly	SMZY0023501	PAS311HR-VG1 3.8 Backup Capacitor 0.03F, Module Assembly, KOREA TAIYO YUDEN.CO., LTD.	
6	SPFY00	PCB, Main	SPFY0246001	SPFY0246001 LGP350.APRTZY 1.0 FR-4 Stack via 8 0.8 MAIN LG Innotek.com	
1	AGF000000	Package Assembly	- AGF76138401	LGP350.ADEUSV ZZ:Without Color LG-P350 STD(EU1W)	
2	MAY084000	Box, Unit	MAY64973304	BOX Paper 120 56 90 5 COLOR LGP350.AVIPSZ ZZ:Without Color LG-P350 STD(EU1W)	
2	APLY00	PALLET ASSY	- APLY0003901	GD510 BALBK BK, ZZ, EU1 TYPE_Body(SW)+Cap(EU)+AL_1200EA	
3	MBEC00	Box, Carton	MBEC0003601	COMPLEX GD510 CZESV ZZ:Without Color -	
3	MCCL00	Cap, Box	MCCL0002501	COMPLEX GD510 CZESV ZZ:Without Color -	
3	MPCY00	Pallet	MPCY0012403	COMPLEX KG800 FRABK DB:DARK BLUE -	
2	MBAD00	Bag, Vinyl	MBAD0005204	COMPLEX LG-LX260 SPRAG ZZ:Without Color -	
2	MBEE00	Box, Master	MBEE0061001	COMPLEX GD510 CZESV ZZ:Without Color -	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
2	MLAC00	Label, Barcode	MLAC0004541	COMPLEX HB620 KPNBK ZZ:Without Color -	
2	MLAJ00	Label, Master Box	MLAJ0004402	COMPLEX CG300 CGR ZZ:Without Color LABEL, MASTER BOX(for CGR TDR 2VER. mbox_label)	
2	MLAZ01	Label	MLAZ0050901	COMPLEX KU990 GBRBK ZZ:Without Color -	
1	AAD000000	Addition Assembly	- AAD85729101	LGP350.ADEUSV SV:Silver -	
2	ACQ02	Cover Assembly, Battery	- ACQ85463001	LGP350.APRTZY SV:Silver -	
3	MCK000000	Cover	MCJZ0066801	COMPLEX LG-P350 PRT SV:Silver MOLD, PC LUPOY SC-1004A,	
3	MJN061100	Tape, Protect	MJN67753701	COMPLEX LGP350.APRTZY ZZ:Without Color battery_cover	

12. EXPLODED VIEW & REPLACEMENT PART LIST

12.2 Replacement Parts

<Main component>

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
6	R530	Resistor, Chip	ERHZ0000284	RC1005F434CS 430KOHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C531, C554	Capacitor, TA, Conformal	EAE62287901	251M1002107MR12A168 0.0001F 20% 10V 50UA - 55TO+125C 0.6OHM 3.2x1.6x1.1 NONE SMD R/TP MATSUO ELECTRIC CO., LTD	
6	X200	Oscillator, TCXO	EXST0002301	1XTW38400FAA 384MHZ 2.5PPM 2.8V 3.2x2.5x0.9MM ; SMD R/TP DAISHINKU CORPORATION.	
6	X300	Oscillator, VCTCXO	EAW61503501	1XTV19200FAA 19.2MHZ 2PPM 2.8V 3.2x2.5x0.9MM ; SMD R/TP DAISHINKU CORPORATION.	
6	C210, C228, C243, C247, C248, C311, C313, C545, C546, C548, C566, C571, C805	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	
6	R1022, R201	PCB ASSY, MAIN, PAD SHORT	SAFP0000401	LG-LU3000 LGTBK, MAIN, A,	
6	C1001	Inductor, Multilayer, Chip	ELCH0004708	1005GC2T2N7SLF 2.7NH 0.3NH - 300mA 0.17OHM 5.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1006, C1007, C1008, C1012, C1015, C1017, C1037, C1039, C1044, C1051, C1074, C1078, C1090, C1097, C568, L1023, L1035	Capacitor, Ceramic, Chip	ECZH0000830	C1005C0G1H330JT000F 33pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C1043, C1045, C1046, C1049, C1069, C300, C404, C408, C412, C414, C418, C422, C426, C430, C435, C502, C517, C518, C521, C522, C523, C524, C529, C608, C609, C615, C616, C618	Capacitor, Ceramic, Chip	ECZH0025920	GRM033R71C102K 1nF 10% 16V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1024, C1026, C1057, C1058, C1060, C1061, C1063, C1067, C1100, C200, C201, C202, C206, C207, C208, C209, C213, C214, C225, C227, C241, C301, C304, C310, C312, C314, C315, C316, C317, C318, C319, C324, C400, C401	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R - 55TO+85C 0603 R/TP - TDK CORPORATION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C403, C406, C407, C409, C416, C419, C420, C423, C424, C428, C432, C434, C501, C503, C504, C505, C506, C510, C511, C512, C513, C514, C534, C549, C555, C556, C559, C560, C605, C623, C633, C636, C638, C802	Capacitor, Ceramic, Chip	ECCH0009101	C0603X5R0J104KT00NN 0.1uF 10% 6.3V X5R - 55TO+85C 0603 R/TP - TDK CORPORATION	
6	C410, C421, C525	Capacitor, Ceramic, Chip	ECCH0017501	CL10A226MQ8NRNE 22uF 20% 6.3V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	R1014, R1020, R505, R603	Resistor, Chip	ERHY0009504	MCR006YZPJ102 1KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R1017, R1018, R303, R317, R318, R702, R810, R811, R813	Resistor, Chip	ERHY0009503	MCR006YZPJ101 100OHM 5% 1/20W 0603 R/TP - ROHM.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1072, C1081, L1040	Capacitor, Ceramic, Chip	ECCH0000195	GRM1555C1H3R9C 3.9pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R623, R626	Resistor, Chip	ERHY0009302	MCR006YZPF1001 1KOHM 1% 1/20W 0603 R/TP - ROHM.	
6	C700, C701, C702, C710, C806	Capacitor, Ceramic, Chip	ECCH0004904	GRM155R60J105K 1uF 10% 6.3V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R1002, R704, R705	Resistor, Chip	ERHZ0000443	MCR01MZP5J222 2.2KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L501, L502, L503	Inductor, Wire Wound, Chip	ELCP0008005	CPI2520LZ4R7ME 4.7UH 20% 0V 900mA 0.3OHM 0HZ 0 SHIELD 2.5X2X1MM NONE R/TP SAMWHA CAPACITOR CO, LTD.	
6	R1016	Resistor, Chip	ERHY0009531	MCR006YZPJ620 62OHM 5% 1/20W 0603 R/TP - ROHM.	
6	C402, C405, C509, C535, C537, C538, C539, C540, C543, C544, C547, C603, C614, C620, C621, C622, C704, C706, C707, C708, C709, C711, C712, C713	Capacitor, Ceramic, Chip	ECCH0000198	CL05A225MQ5NSNC 2.2uF 20% 6.3V X5R -55TO+85C 1005 R/TP . SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	R800	Resistor, Chip	ERHY0009518	MCR006YZPJ224 220KOHM 5% 1/20W 0603 R/TP - ROHM.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R524, R531, R609, R610, R622, R700, R701, R707, R708	Resistor, Chip	ERHY0009526	MCR006YZPJ472 4.7KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	U603	IC, Acceleration Sensor	EUSY0408701	KR3DH NONE NONE LGA R/TP 16P - ST MICROELECTRONICS ASIA PACIFIC PTE LTD.	
6	L1018	Inductor, Multilayer, Chip	ELCH0001034	HK1005 3N3S-T 3.3NH 0.3NH - 300mA 0.16OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	R1006	Resistor, Chip	ERHZ0000509	MCR01MZP5J750 75OHM 5% 1/16W 1005 R/TP - ROHM.	
6	FB200, FB201, FB202, FB203, FB204	Filter, Bead	SFBH0008101	BLM15AG601SN1D 600 ohm 1.0X0.5X0.5 25% 0.6 ohm 0.3A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	ZD800, ZD801, ZD802	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.5V 0 10V 0A 200mW SC70 R/TP 6P 5 ROHM.	
6	R315	Resistor, Chip	ERHY0000104	MCR01MZP5F49R9 49.9OHM 1% 1/16W 1005 R/TP - ROHM.	
6	R1004, R1005	Resistor, Chip	ERHZ0000415	MCR01MZP5J131 130OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R520	Resistor, Chip	ERHZ0000203	MCR01MZP5F1002 10KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C1048, C1071, C231	Capacitor, Ceramic, Chip	ECCH0005604	GRM188R60J106M 10000000 pF, 6.3V, M, X5R, TC, 1608, R/TP, 0.8 mm MURATA MANUFACTURING CO., LTD.	
6	C1036, C1054, C1056, C203, C229, C230, C714	Capacitor, Ceramic, Chip	ECCH0017601	CL05A475MQ5NRNC 4.7uF 20% 6.3V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R504, R629, R801, R802, R803, R804, R805	Resistor, Chip	ERHY0009527	MCR006YZPJ473 47KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R307, R523, R525, R526, R605, R617, R618, R619, R620	Resistor, Chip	ERHY0009516	MCR006YZPJ222 2.2KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R203, R316, R606, R703, R710	Resistor, Chip	ERHY0009506	MCR006YZPJ104 100KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	FL1007	Filter, Duplexer, IMT	SDMY0003001	B7697 2140000000 2112.4 to 2167.6 1950000000 1922.4 to 1977.6 2.2 1.8 2.5x2.0x0.89 DUAL SMD R/TP - EPCOS PTE LTD.	
6	U500	IC, LDO Voltage Regulator	EUSY0407201	BU33TD4WNVX SSON004, 4, R/TP, 3.3V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	C1082, L1039	Capacitor, Ceramic, Chip	ECCH0000104	MCH155A030C 3pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C1083, C1095	Capacitor, Ceramic, Chip	ECCH0000183	GRM1555C1H1R8C 1.8pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	D500	Diode, Switching	EDSY0011901	SDB310Q 340mV 30V 200mA 1A 0SEC 150mW EMD2 R/TP 2P 1 AUK CORP	
6	U601	IC, Speaker Amplifier	EUSY0404001	TPA6202A1ZQVR BGA, 8, R/TP, Class AB SPK Amp, IC, Audio AmplifierIC, Audio Amplifier - BGA R/TP 8P - TEXAS INSTRUMENTS KOREA LTD, HONGKONG BRANCH.	
6	C1013, C1034, C233	Capacitor, Ceramic, Chip	ECCH0000143	MCH155CN102KK 1nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C1070, C307, C309, C320	Capacitor, Ceramic, Chip	ECCH0009109	C0603X7R1H331KT00NN 330pF 10% 50V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C417, C427, C431, C519, C520, C530, C604, C624, C639	Capacitor, Ceramic, Chip	ECCH0007803	CL10A106MP8NNNC 10uF 20% 10V X5R -55TO+85C 1608 R/TP 0.8MM SAMSUNG ELECTRO- MECHANICS CO., LTD.	
6	C1080	Inductor, Multilayer, Chip	ELCH0001049	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C1079, C1091	Inductor, Multilayer, Chip	ELCH0005020	HK1005 1N0S 1NH 0.3NH - 300mA 0.08OHM 10GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	U1000	IC, RF Transceiver, 3G	EUSY0344001	RTR6285 1.8VTO3V, 2.7VTO3V 500mW QFN R/TP 68P QUALCOMM INCORPORATED.	
6	R607, R608	Resistor, Chip	ERHY0009502	MCR006YZPJ100 10OHM 5% 1/20W 0603 R/TP - ROHM.	
6	FB700	Filter, Bead	SFBH0009901	HB-1M1005-121JT 120 ohm 1.0X0.5X0.5 25% 0.3 ohm 0.5A SMD R/TP 2P 0 CERATECH CORPORATION	
6	R806	Resistor, Chip	ERHZ0000530	RC1005J512CS 5.1KOHM 5% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L1024	Inductor, Multilayer, Chip	ELCH0001048	1005GC2T10NJLF 10NH 5% - 250mA 0.42OHM 2.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C1028, C1030, C1053, C1055, C1059, C1066, C634	Capacitor, Ceramic, Chip	ECCH0002001	C1005JB0J104KT000F 0.1uF 10% 6.3V Y5P - 30TO+85C 1005 R/TP - TDK CORPORATION	
6	R311, R613, R627	Resistor, Chip	ERHZ0000204	MCR01MZF5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	FB601, FB602	Filter, Bead	SFBH0001503	HH-1M1608-601JT_1 600 ohm 1.6X0.8X0.8MM 25% 0.35 ohm 0.75A SMD R/TP 2P 0 CERATECH CORPORATION	
6	FL500	Filter, EMI/Power	SFEY0015301	NFM18PC104R1C3 ESD/EMI 0HZ 0.1uF 0H SMD R/TP MURATA MANUFACTURING CO., LTD.	
6	C1105	Inductor, Multilayer, Chip	ELCH0004721	1005GC2T2N2SLF 2.2NH 0.3NH - 300mA 0.16OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C323, C570, C607, C617, C800, C801, C803, C804	Capacitor, Ceramic, Chip	ECZH0025916	GRM0335C1E330J 33pF 5% 25V NP0 -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C1042, C302, C303, C327, C328	Capacitor, Ceramic, Chip	ECZH0025917	GRM0335C1E470J 47pF 5% 25V NP0 -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C1023, C1029, C500, C515, C561, C619	Capacitor, Ceramic, Chip	ECCH0009216	GRM0335C1E220J 22pF 5% 25V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	L1016	Inductor, Multilayer, Chip	ELCH0003844	LQG15HS2N0S02D 2NH 0.3NH - 300mA 0.1OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	VA701, VA702, VA703, VA704, VA705, VA706, VA707	Varistor	SEVY0004301	ICVL0518100Y500FR 18V 0% 10F 1.0*0.5*0.55 NONE SMD R/TP INNOCHIPS TECHNOLOGY	
6	C1009, C1011, C1047, C205, C308, C411, C413, C415, C425, C429, C433, C569, C627	Capacitor, Ceramic, Chip	ECCH0009106	C0603X7R1C103KT 10nF 10% 10V X7R -55TO+125C 0603 R/TP - TDK CORPORATION	
6	CN501	Connector, I/O	ENRY0009601	GU074-5P-SD-E1500 5P 0.65MM ANGLE RECEPTACLE DIP R/TP - LS Mtron Ltd.	
6	U1002	IC, Power Amplifier	SMPY0020101	ACPM-5281-TR1 dBm, %, A, dBc, dB, 4x5, SMD, 3G Dual PAM B1+8. Coupler Integrated, LGA, R/TP, AVAGO TECHNOLOGIES INTERNATIONAL SALES PTE. LIMITED	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R624, R625	Resistor, Chip	ERHZ0000295	MCR01MZIP5F5102 51KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	C204, C239, C242	Capacitor, Ceramic, Chip	ECCH0032801	GRM033R60J224M 0.00000022F 20% 6.3V X5R - 55TO+85C 0603 R/TP 0.3MM MURATA MANUFACTURING CO., LTD.	
6	C1005, C1014	Capacitor, Ceramic, Chip	ECZH0000844	C1005C0G1H680JT000F 68pF 5% 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C1065, C1096, C1101, L1014, L202, R1000	Capacitor, Ceramic, Chip	ECZH0000813	C1005C0G1H101JT 100pF 5% 50V NP0 -55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L1001, L1010	Capacitor, Ceramic, Chip	ECZH0001002	C1005CH1H0R5BT000F 0.5pF 0.1PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	C325	Capacitor, Ceramic, Chip	ECCH0009203	GRM033R60J333K 33nF 10% 6.3V X5R -55TO+85C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	C1033, C1038, L1027	Inductor, Multilayer, Chip	ELCH0001036	HK1005 5N6S-T 5.6NH 0.3NH - 300mA 0.23OHM 4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	R305	Resistor, Chip	ERHZ0000404	MCR01MZIP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C1003, C1010, L1021	Capacitor, Ceramic, Chip	ECCH0000901	C1005C0G1H2R2CT000F 2.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	L1006	Inductor, Multilayer, Chip	ELCH0004717	1005GC2T82NJLF 82NH 5% - 150mA 2.1OHM 700MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R808, R809	Resistor, Chip	ERHY0003301	MCR01MZIP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C211, C234	Capacitor, Ceramic, Chip	ECCH0000182	GRM155R61A104K 0.1uF 10% 10V X5R -55TO+85C 1005 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R313	Resistor, Chip	ERHY0009592	MCR006YZPJ202 2KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	C1004, L1004, L1007	Inductor, Multilayer, Chip	ELCH0004714	1005GC2T18NJLF 18NH 5% - 200mA 0.65OHM 1.6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	FB603, FB604, FB605, FB606	Filter, Bead	SFBH0008102	BLM15HD182SN1D 1800 ohm 1.0X0.5X0.5 25% 2.2 ohm 0.2A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	CN701	Connector, BtoB	ENBY0051001	GB042-10S-H10-E3000 10P 0.4MM STRAIGHT FEMALE SMD R/TP 1M - LS Mtron Ltd.	
6	U200	Filter, Separator, FEM	SMZY0028001	RF5501 - - - RF5501, QFN, 12p, 2.0*2.0*0.5, SP3T+LNA for BT/WiFi with BCM4325/29/30 RF MICRO DEVICES INC	
6	R300, R502	Resistor, Chip	ERHZ0000222	MCR01MZP5F1503 150KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R521	Resistor, Chip	ERHZ0000537	MCR01MZP5F6803 680KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R302, R510	Resistor, Chip	ERHZ0000490	MCR01MZP5J510 51OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R1021	Resistor, Chip	ERHY0009501	MCR006YZPJ000 0OHM 5% 1/20W 0603 R/TP - ROHM.	
6	L1034	Inductor, Multilayer, Chip	ELCH0001405	LL1005-FHL3N3S 3.3NH 0.3NH - 400mA 0.16OHM 9.1GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	FL1005	Filter, Saw	SFSY0028101	SAFEB1G95KA0F00 1950 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	U301	IC, MCP, NOR	EUSY0216301	NC7SV00P5X_NL SC70 , 5 PIN, R/TP , Single 2-Input NAND Gate FAIRCHILD SEMICONDUCTOR	
6	U501	IC, PMIC	EUSY0342201	PM7540 -0.5~18 N/A 0W CSP R/TP 137P - QUALCOMM INCORPORATED.	
6	R200	Resistor, Chip	ERHZ0000221	MCR01MZP5F1502 15KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	R309, R401, R404, R405	PCB ASSY, MAIN, PAD OPEN	SAFO0000401	AX3100 ATL SV_SHIPBACK, MAIN, A, 0OHM DNI	
6	C1068, C1084, C1085, C1086, C1087, C246	Capacitor, Ceramic, Chip	ECCH0009103	C0603C0G1H101JT00NN 100pF 5% 50V X7R - 55TO+125C 0603 R/TP - TDK CORPORATION	
6	L207	Inductor, Multilayer, Chip	ELCH0003842	LQG15HSR10J02D 100NH 5% - 150mA 1.25OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1088	Inductor, Multilayer, Chip	ELCH0004725	1005GC2T33NJLF 33NH 5% - 200mA 1OHM 1.3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	FL700, FL701, FL702, FL703, FL704	Filter, EMI/Power	SFEY0010501	ICVE10184E150R101FR ESD/EMI 0HZ 15pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	FL705, FL706, FL707	Filter, EMI/Power	SFEY0011401	ICVE10184E070R101FR ESD/EMI 0HZ 7.5pF 0H SMD R/TP INNOCHIPS TECHNOLOGY	
6	U202	IC, LDO Voltage Regulator	EUSY0407101	BU28TD4WNVX SSON004, 4, R/TP, 2.8V 150mA Single LDO, IC, LDO Voltage RegulatorIC, LDO Voltage Regulator ROHM.	
6	R319, R706, R807	Resistor, Chip	ERHZ0000434	MCR01MZP5J1R0 1OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C245	Capacitor, Ceramic, Chip	ECCH0009212	GRM0335C1E4R7C 4.7pF 0.25PF 25V X7R - 55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R501	Resistor, Chip	ERHZ0000405	MCR01MZP5J103 10KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L209	Inductor, Multilayer, Chip	ELCH0003820	LQG15HS3N0S02D 3NH 0.3NH - 300mA 0.17OHM 6GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L205	Inductor, Multilayer, Chip	ELCH0004108	LLV0603-FH2N2S 2.2NH 0.3NH - 250mA 0.2OHM 8.5GHZ 5 SHIELD NONE 0.6X0.3X0.3MM R/TP TOKO, INC.	
6	VA602, VA603	Varistor	SEVY0010501	IECS0505C040FR 10V 0% 4E-12F 1.0x0.5x0.3 IEC61000-4-1 (ESD) level #4 SMD R/TP INNOCHIPS TECHNOLOGY	
6	R517	Resistor, Chip	ERHZ0000318	MCR01MZP5F8062 80.6KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	VA700, VA800	Varistor	SEVY0001001	EVLC14S02050 14V 0% 50F 1.0*0.5*0.6 NONE SMD R/TP AMOTECH CO., LTD.	
6	R516	Resistor, Chip	ERHZ0000487	MCR01MZP5J474 470KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	C526, C527, C528, C541, C542	Capacitor, Ceramic, Chip	ECCH0006201	C1608X5R0J475KT000N 4.7uF 10% 6.3V X5R - 55TO+85C 1608 R/TP - TDK CORPORATION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	CN300	Connector, BtoB	ENBY0045901	AXT614124 14P 0.4MM STRAIGHT HEADER SMD R/TP 1M - BJ PANASONIC ELECTRONIC PARTS CO., LTD	
6	R1013	Resistor, Chip	ERHZ0000212	MCR01MZP5F1202 12KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	L201	Capacitor, Ceramic, Chip	ECCH0000112	MCH155C150J 15pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R310	Resistor, Chip	ERHZ0000463	MCR01MZP5J330 33OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C222, C223, C224, C244	Capacitor, Ceramic, Chip	ECCH0009514	MCH032A(AN)100DK 10pF 0.5PF 25V X7R - 55TO+125C 0603 R/TP - ROHM.	
6	L600	Inductor, Multilayer, Chip	ELCH0010402	LK1005 R27K-T 270NH 10% - 25mA 0.91OHM 120MHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	U503	IC, Over Voltage Protection	EUSY0374601	MAX14528 MAX14528, TDFN, 8, R/TP, Programmable OVP MAXIM INTEGRATED PRODUCTS INC.	
6	R1010, R514	Resistor, Chip	ERHZ0000402	MCR01MZP5J100 10OHM 5% 1/16W 1005 R/TP - ROHM.	
6	U604	IC, Geomagnetic Sensor	EUSY0418501	AMI304 QFN, 12, R/TP, Geomagnetic Sensor, IC, A/D ConverterIC, A/D Converter - QFN R/TP 12P - AICHI STEEL CORPORATION	
6	R1008, R1009	Resistor, Chip	ERHZ0000517	MCR01MZP5J910 91OHM 5% 1/16W 1005 R/TP - ROHM.	
6	U1003	IC, RF Amplifier	SMZY0025501	RF2815 3.3*2.1*1.0, FILTER+GPS LNA+FILTER MODULE, GPS, RF MICRO DEVICES INC	
6	D600, D601, D603, D604, ZD502	Diode, TVS	EDTY0010101	ESD9B5.0ST5G ESD9B5.0ST5G, SOD-923, 5 V, 300 mW, R/TP, 15pF SCG HONG KONG SAR LTD.	
6	C236, C237	Capacitor, Ceramic, Chip	ECCH0000122	MCH155A470JK 47pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	Q601	TR, Bipolar	EBK61592201	LTC014EEBFS8 NPN 0V 0V 50V 100mA 0A 35 150mW EMT3 R/TP 3P ROHM Semiconductor KOREA CORPORATION	
6	U700	IC, Sub PMIC	EUSY0378001	AAT2862 AAT2862, TQFN34, 24, R/TP, 3x4x0.8 Advanced Analogic Technologies HK Limited	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R304	Resistor, Chip	ERHZ0000438	MCR01MZP5J203 20KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	FL200	Filter, Dielectric	SFDY0003201	DEA162450BT-2096A1-H BPF 2.45GHZ 100MHz SMD R/TP 3P TDK CORPORATION	
6	C1092	Inductor, Multilayer, Chip	ELCH0001035	HK1005 4N7S-T 4.7NH 0.3NH - 300mA 0.21OHM 4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP TAIYO YUDEN CO., LTD	
6	D800, D801, D802	Diode, TVS	EDTY0009801	VSMF05LCC 5V 6V 12V 2A 25W SOT-963 R/TP 6P 5 PROTEK DEVICES INC.	
6	R400	Wire Pad, Short	SAFP0000501	LG-VS760 VRZ	
6	C1025, C1027, C1064, C238, C564	Capacitor, Ceramic, Chip	ECCH0000115	MCH155A220JK 22pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C305	Capacitor, TA, Conformal	ECTH0001903	F980J226MMA 22 uF, 6.3V, M, L_ESR, 1608, R/TP NICHICON CORPORATION, EAST JAPAN SALES OFFICE	
6	C532, C635	Capacitor, Ceramic, Chip	ECCH0000155	MCH153CN103KK 10nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C705	Capacitor, Ceramic, Chip	ECCH0007804	CL05A225MP5NSNC 2.2uF 20% 10V X5R -55TO+85C 1005 R/TP 0.5MM SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C1077	Inductor, Multilayer, Chip	ELCH0004712	1005GC2T3N9SLF 3.9NH 0.3NH - 300mA 0.22OHM 4GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	C321, C322	Capacitor, Ceramic, Chip	ECCH0010501	GRM1555C1H7R5D 7.5pF C0G TYPE(No X7R) MURATA MANUFACTURING CO., LTD.	
6	L1017, L1019, L1025, L601, L602	Inductor, Multilayer, Chip	ELCH0001411	LL1005-FHL1N2S 1.2NH 0.3NH - 400mA 0.1OHM 16GHZ 7 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	R306, R314, R402, R611, R612	Resistor, Chip	ERHY0009505	MCR006YZPJ103 10KOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R1011, R1012	Resistor, Chip	ERHZ0003801	MCR01MZP5J5R1 5.1OHM 5% 1/16W 1005 R/TP - ROHM.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C610, C611, C628	Capacitor, Ceramic, Chip	ECZH0001217	GRM155R60J474K 470nF 10% 6.3V X5R -25TO+70C 1005 BK-DUP - MURATA MANUFACTURING CO., LTD.	
6	FL1003	Filter, Saw	SFSY0037501	SAFE897MAM0F00 897.5MHz 1.4*1.1*0.6 SMD R/TP 5P MURATA MANUFACTURING CO., LTD.	
6	C612, C613	Capacitor, Ceramic, Chip	ECCH0000161	MCH153CN333KK 33nF 10% 16V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R506	Resistor, Chip	ERHZ0003901	RC2012FR100CS 0.1OHM 1% 1/8W 2012 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	U401	IC, MCP, NAND	EUSY0363306	H8BCS0UN0MCR-4EM NAND/4G SDRAM/2G 1.7VTO1.9V 13.0x10.5x1.2 TR 137P - - - HYNIX SEMICONDUCTOR INC.	
6	C606, C703	Capacitor, Ceramic, Chip	ECCH0005602	GRM188R61C225K 2.2uF 10% 16V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	L1030	Inductor, Multilayer, Chip	ELCH0001430	LL1005-FHLR10J 100NH 5% - 150mA 2.2OHM 1.03GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	C1016, C1021	Capacitor, Ceramic, Chip	ECZH0000839	C1005C0G1H4R7CT000F 4.7pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	D301, D602	Diode, TVS	EDTY0008606	PRSB6.8C 4.7V 5.7 - - 10W - R/TP 2P 1 PROTEK DEVICES INC.	
6	C235, C240	Capacitor, Ceramic, Chip	ECCH0007802	CL10A475KP8NNNC 4.7uF 10% 10V X5R -55TO+85C 1608 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C226	Capacitor, Ceramic, Chip	ECZH0000806	C1005C0G1H050CT000F 5pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	FL1001	Filter, Saw, Dual	SFSB0001902	SAWEN1G84CN0F00 1842.5MHz, 1960MHz 1.8*1.4*0.5 SMD R/TP 10P MURATA MANUFACTURING CO., LTD.	
6	U600	IC, Audio Sub System	EUSY0420001	TPA2055D3 1.6~5.5V 0W WLCSP R/TP 20P - TEXAS INSTRUMENTS INCO.	
6	C1040, C1052	Inductor, Multilayer, Chip	ELCH0004713	1005GC2T6N8JLF 6.8NH 5% - 250mA 0.32OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	R500	Resistor, Chip	ERHZ0000488	MCR01MZP5J4R7 4.7OHM 5% 1/16W 1005 R/TP - ROHM.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1094	Capacitor, Ceramic, Chip	ECCH0000701	C1005C0G1H1R2CT000F 1.2pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - TDK CORPORATION	
6	J800	Card Socket	ENSY0024302	KP09NC-6S-2.54SF SIM 6P ANGLE SMD R/TP Stroke : 11.25mm HIROSE KOREA CO., LTD	
6	C1075	Inductor, Multilayer, Chip	ELCH0004709	1005GC2T3N3SLF 3.3NH 0.3NH - 300mA 0.19OHM 4.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	D501	Diode, Switching	EDSY0010501	KDS114E 900mV 30V 100mA 1A 0SEC 100mW ESC R/TP 2P 1 KEC CORPORAITION	
6	L1032	Capacitor, Ceramic, Chip	ECCH0000196	MCH155A0R75C 0.75pF 0.25PF 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	R1007	Resistor, Chip	ERHZ0000456	MCR01MZP5J2R2 2.2OHM 5% 1/16W 1005 R/TP - ROHM.	
6	C562	Capacitor, Ceramic, Chip	ECZH0003503	GRM188R61E105K 1uF 10% 25V X5R -55TO+85C 1608 R/TP - MURATA MANUFACTURING CO., LTD.	
6	R509	Resistor, Chip	ERHZ0004201	RC1005F1213CS 121KOHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L208	Inductor, Wire Wound, Chip	ELCP0012101	CIG21L3R3MNE 0H 20% - 800mA 0.22OHM - - SHIELD 2X1.25X1MM NONE - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	L500	Inductor, Wire Wound, Chip	ELCP0011901	CPI2012NHL2R2MT 2.2UH 20% - 800mA 0.25OHM - - SHIELD 2X1.25X1MM NONE - SAMWHA CAPACITOR CO, LTD.	
6	R604	Resistor, Chip	ERHY0009507	MCR006YZPJ105 1MOHM 5% 1/20W 0603 R/TP - ROHM.	
6	R1003, R312	Resistor, Chip	ERHZ0000483	MCR01MZP5J470 47OHM 5% 1/16W 1005 R/TP - ROHM.	
6	R403	Resistor, Chip	ERHZ0000406	MCR01MZP5J104 100KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	ZD401	Diode, TVS	EDTY0008601	PSD05-LF 5V 6 13.5V 42A 500W SOD323 R/TP 2P 1 PROTEK DEVICES INC.	
6	U1001	RF Module	SMRH0006201	SKY77544 MHz, MHz, POLA EDGE QUAD TX MODULE, SP9T, 6.0*6.0*1.0, 28p, SKYWORKS SOLUTIONS INC.	
6	L1015	Inductor, Multilayer, Chip	ELCH0001408	LL1005-FHL6N8J 6.8NH 5% - 300mA 0.23OHM 5.6GHZ 9 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	R301	Resistor, Chip	ERHY0000290	MCR01MZF5J304 300KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	L1038	Inductor, Multilayer, Chip	ELCH0003838	LQG15HS8N2J02D 8.2NH 5% - 300mA 0.24OHM 3.7GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	L1009	Inductor, Multilayer, Chip	ELCH0004711	1005GC2T22NJLF 22NH 5% - 200mA 0.8OHM 1.5GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	U504	IC, MUIC	EUSY0372001	TS5USBA33402YZPR TS5USBA33402, MUIC WCSP R/TP 20P TEXAS INSTRUMENTS KOREA LTD, HONGKONG BRANCH.	
6	L504	Inductor, Wire Wound, Chip	ELCP0008004	MIP2016D4R7M 4.7UH 30% 0V 900mA 0.16OHM 0HZ 0 SHIELD 2.0X1.6X1.0MM NONE R/TP FDK CORPORATION.	
6	S800	Socket, Card	ENSY0023601	SCHA4B0402 Micro-SD 8P ANGLE SMD R/TP - ALPS ELECTRIC KOREA CO., LTD.	
6	U300	IC, Digital Baseband Processor, 3G	EUSY0392302	MSM7227 0VTO0V 0W 560P - BGA R/TP 560P QUALCOMM INCORPORATED.	
6	FL1000	Filter, Saw, Dual	SFSB0001802	SAWEN881MCN0F00 881.5MHz, 1960MHz 1.8*1.4*0.5 SMD R/TP 10P MURATA MANUFACTURING CO., LTD.	
6	C232	Capacitor, Ceramic, Chip	ECCH0000149	MCH155CN332KK 3.3nF 10% 50V X7R -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	C212	Capacitor, Ceramic, Chip	ECZH0000846	C1005C0G1H8R2CT000F 8.2pF 0.25PF 50V NP0 - 55TO+125C 1005 R/TP - TDK KOREA COOPERATION	
6	FL1004	Filter, Duplexer, IMT	SDMY0002801	B7953 942500000 925 to 960 897500000 880 to 915 3.8 2.9 2.5x2.0x0.94 DUAL SMD R/TP - EPCOS PTE LTD.	
6	FL1006	Filter, Saw	SFSY0033404	B9444 1575.42MHz 1.4*1.1*0.45 SMD R/TP 5P EPCOS PTE LTD.	
6	C1099	Capacitor, Ceramic, Chip	ECCH0000113	MCH155A180J 18pF 5% 50V NP0 -55TO+125C 1005 R/TP - ROHM Semiconductor KOREA CORPORATION	
6	L1000	Inductor, Multilayer, Chip	ELCH0004727	1005GC2TR10JLF 100NH 5% - 100mA 2.3OHM 600MHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP PILKOR ELECTRONICS LTD.	
6	U302	IC, Flip Flop	EUSY0408201	74LVC1G79GM 1.65~5.5V - D FLIP-FLOP SOT R/TP 6P - STC CORP.	
6	R630	Resistor, Chip	ERHY0009524	MCR006YZPJ470 47OHM 5% 1/20W 0603 R/TP - ROHM.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	L206	Inductor, Multilayer, Chip	ELCH0001421	LL1005-FHL47NJ 47NH 5% - 200mA 1.3OHM 1.5GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	J600	Jack, Phone	ENJE0008001	JAM3333-F32-7F 1P 4P ANGLE R/TP 4mM BLACK 6P - HON HAI PRECISION INDUSTRY CO., LTD.	
6	R1019	Resistor, Chip	ERHZ0000348	MCR01MZP5F12R0 12OHM 1% 1/16W 1005 R/TP - ROHM.	
6	U201	IC Assembly	EUSY0433901	BCM43291SKUBG WLBGA , 181 , R/TP , WiFi(11bgn)+BT+FM(Rx), BT3.0+HS, 6.57x5.62x0.55, 182pin, 0.4p , ; , IC Assembly BROADCOM ASIA DISTRIBUTION PTE LTD	
6	R817	Resistor, Chip	ERHY0000105	MCR01MZP5F51R0 51OHM 1% 1/16W 1005 R/TP - ROHM.	
6	X500	Crystal	EXXY0024301	CM315(12.5PF) 32.768KHZ 20PPM 12.5PF 32*15 SMD R/TP CITIZEN DISPLAYS CO., LTD.	
6	L1013	Inductor, Multilayer, Chip	ELCH0003819	LQG15HS12NJ02D 12NH 5% - 300mA 0.28OHM 3GHZ 8 SHIELD NONE 1.0X0.5X0.5MM R/TP MURATA MANUFACTURING CO., LTD.	
6	R308	Resistor, Chip	ERHY0024201	RC1005F6041CS 6.04KOHM 1% 1/16W 1005 R/TP - SAMSUNG ELECTRO-MECHANICS CO., LTD.	
6	C306	Capacitor, Ceramic, Chip	ECCH0009230	GRM033R61A222K 2.2nF 10% 25V X5R -55TO+85C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	Q600	FET	EQFP0004501	SI1305-E3 P-CHANNEL MOSFET -8V +-8 -0.92A 0.28OHM 340mW SOT323 R/TP 9P VISHAY INTERTECHNOLOGY ASIA PTE LTD	
6	CN500	Connector, Terminal Block	ENZY0030401	KQ03LV-3R 3, 2.5 mm, STRAIGHT, Gold, Twin One board 5.4mm HIROSE KOREA CO., LTD	
6	L1003	Inductor, Multilayer, Chip	ELCH0001425	LL1005-FHL82NJ 82NH 5% - 150mA 1.9OHM 1.15GHZ 10 SHIELD NONE 1.0X0.5X0.5MM R/TP TOKO, INC.	
6	CN700	Connector, BtoB	ENBY0036001	GB042-40S-H10-E3000 40P 0.4MM STRAIGHT SOCKET SMD R/TP 1M ENGINEERING PLASTIC UL94V-0 AU OVER NI LS Mtron Ltd.	
6	U701	IC, Level Translator	EUSY0391601	NLSV1T244-D 0.9~4.5V - LEVEL SHIFTER - R/TP 6P - SCG HONG KONG SAR LTD.	
6	R515	Resistor, Chip	ERHZ0000439	MCR01MZP5J204 200KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	CN702	Connector, BtoB	ENBY0034201	GB042-24S-H10-E3000 24P 0.40MM STRAIGHT SOCKET SMD R/TP 1M - LS Mtron Ltd.	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	PartNumber	Spec	Remark
6	C1018	Capacitor, Ceramic, Chip	ECCH0009226	GRM0335C1E390J 39pF 5% 25V X7R -55TO+125C 0603 R/TP - MURATA MANUFACTURING CO., LTD.	
6	Q500	FET	EQFP0008601	NUS5530MN P-CHANNEL MOSFET -20V 20 -3.9A 0.07OHM 1.3W TSOP6 R/TP 8P ON SEMICONDUCTOR	
6	FL1002	Filter, Saw	SFSY0028201	SAFE62G14FB0F00 - - - - 2P MURATA MANUFACTURING CO., LTD.	
6	R305	Resistor, Chip	ERHZ0000404	MCR01MZP5J102 1KOHM 5% 1/16W 1005 R/TP - ROHM.	
6	LD800, LD801	LED, Chip	EDLH0005901	WHITE 2.85~3.15 20mA 45~60mcd (X:Y=0.273/0.295~0.332/0.358) 75mW 1608 R/TP 2P -	
6	FB603, FB604, FB605, FB606	Filter, Bead	SFBH0008102	BLM15HD182SN1D 1800 ohm 1.0X0.5X0.5 25% 2.2 ohm 0.2A SMD R/TP 2P 0 MURATA MANUFACTURING CO., LTD.	
6	R808, R809	Resistor, Chip	ERHY0003301	MCR01MZP5J101 100OHM 5% 1/16W 1005 R/TP - ROHM.	
6	VA602, VA603	Varistor	SEVY0010501	IECS0505C040FR 10V 0% 4E-12F 1.0x0.5x0.3 IEC61000-4-1 (ESD) level #4 SMD R/TP INNOCHIPS TECHNOLOGY	
6	R311, R613, R627	Resistor, Chip	ERHZ0000204	MCR01MZP5F1003 100KOHM 1% 1/16W 1005 R/TP - ROHM.	
6	ZD800, ZD801, ZD802	Diode, TVS	EDTY0009401	VMNZ6.8CST2R 5.5V 0 10V 0A 200mW SC70 R/TP 6P 5 ROHM.	
6	C210, C228, C243, C247, C248, C311, C313, C545, C546, C548, C566, C571, C805	Capacitor, Ceramic, Chip	ECZH0001215	C1005X5R1A105KT000F 1uF 10% 10V X5R - 55TO+85C 1005 R/TP - TDK KOREA COOPERATION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

12.3 Accessory

Note: This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	PartNumber	Spec	Remark
2	EAY060000	Adapters	SSAD0038301	100-240V, 5060 Hz, 5.1 V, 700 mA, CE, AC-DC Adaptor, 90Vac~264Vac, 5.1V, 700mA, 5060, WALL 2P, USB,	
2	AFN053800	Manual Assembly, Operation	- AFN75431803	LGP350.ADEUSV ZZ:Without Color LGP350 manual assy for DEU	
3	MBM087200	Card, Warranty	MCDF0001110	COMPLEX KP202 VDG ZZ:Without Color PRINTING, (empty),	
3	MFL053800	Manual, Operation	MFL67159903	COMPLEX LGP350.ADEUSV ZZ:Without Color LGP350 manual for DEU	
2	SBPL01	Rechargeable Battery, Lithium Ion	SBPL0103501	BL-42FN-WW 3.7 V, 1250 mAh, 1 CELL, PRISMATIC, 424261, INNERPACK, WW, PRISMATIC, BLACK, TOCAD DONG-HWA CO., LTD	
2	EBX000000	Accessory, Data Cable	SGDY0016701	KCA-ET-8-0020 KCA-ET-8-0020 Micro USB, 1.2M KSD CO., LTD	
2	EAB010200	Earphone, Stereo	SGEY0003744	EMB-LGE004MSKB 3mW 16OHM 115DB 85HZTO126HZ 1M BLACK 3.5 L TYPE STEREO 4POLE PLUG - CRESYN CO., LTD	